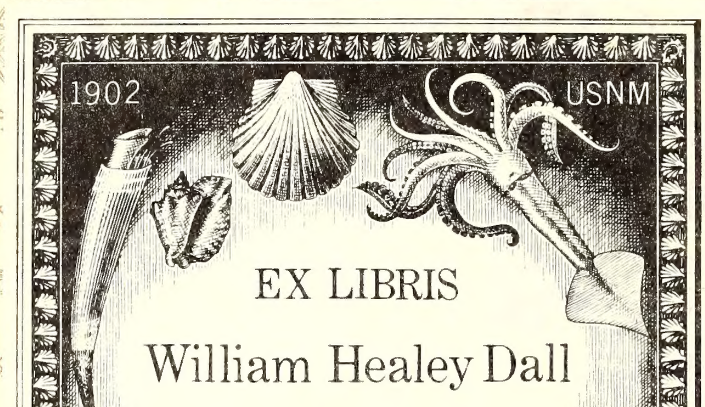

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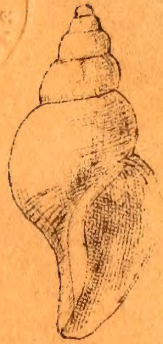

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Distributional List
# of the
WEST AMERICAN MARINE MOLLUSKS
from San Diego, California
to the Polar Sea

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from the proceedings of
The CONCHOLOGICAL CLUB
of SOUTHERN CALIFORNIA

Part II Volume I

John Q. Burch, Editor

1946

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Moll

CLASS SCAPHOPODA

A report was made to the club on this group by Tom Burch at the January, 1943 meeting. This was published in our Minutes #21, pp.5-9, and included a report on the organization, growth, method of living. In addition to the above paper information has been freely used from the following publications: Pilsbry and Sharp, Tryon's Manual of Conchology, vol.17, 1897-98; John B. Henderson, A Monograph of the East American Scaphopod Mollusks, Bulletin 111, U.S. Natl. Museum, 1920; Grant and Gale, Mem. San Diego Soc. Nat. Hist. vol.1, 1931; Oldroyd, The Marine Shells of the West Coast of North America, Stanford Univ. Publ., 1927; Cotton and Godfrey, The Mollusks of South Australia, Part II, 1940.

There are a few special terms used in describing Scaphopods that might well be explained here. The following apply to the genus Dentalium:

Posterior- that portion near the pointed or smaller end.
Anterior- that portion near the aperture or large end.
Primary Ribs- the first or original longitudinal ribs appearing on the tip of the shell.
Secondary Ribs- those later appearing or intercalated between the primaries.
"arc" of the shell- measure of the curvature of the shell determined by the distance in mm. from a line connecting the apex and aperture to the highest point above it in the concave arch of the shell.

The following terms are used in describing the genus Cadulus:

Dorsal- the convex side of the shell.
Ventral- the concave side of the shell.
Equator- the section of maximum diameter of the shell.

The class includes but two families- Dentaliidae and Siphonodentaliidae

Key to Families

a. Shell enlarging uniformly to the greatest diameter at the mouth; shell to some extent at least, sculptured; foot pointed, conical, surrounded by an epipodial process resembling a wing-shaped sheath, which is interrupted or slit, like the break in a fold, on the side next to the head; median tooth of the radula twice as wide as long.. DENTALIIDAE

aa. Shell inflated, generally contracted towards the mouth, smooth and glassy in texture, and without sculpture; foot vermiform, capable of expansion into a subterminal rosette-like disk, not interrupted dorsally; median tooth of radula in width less than double its length... SIPHONODENTALIIDAE

The above key is taken from Cotton and Godfrey.

Family DENTALIIDAE

Genus Dentalium Linnaeus, 1758. Type (by subsequent designation, Montfort, 1810), Dentalium elephantinum Linnaeus (Amboyna).

The family DENTALIIDAE contains but one genus, Dentalium. This has been subdivided into a number of subgenera based chiefly upon the apical characters of the shell. The value of these apical characters for purposes of classification, and therefore the value of the subgenera based upon them, is not altogether assured. " The distinctions can not be sharply drawn, and some species listed under one heading may partake more or less of the characters of some other group" (Henderson).

We shall, therefore, ignore the subgenera of the genus Dentalium.

Key to Species of Dentalium

a. Shell longitudinally strongly ribbed
  b. Ribs typically 6, decreasing anteriorly ......neohexagonum
  b' 6-ribbed at apex, increasing to 12, and at aperture with 17-24 alternating riblets; length 27 mm, about 9 x Diam. oerstedii
  b'' Similar, but glossy with finer sculpture and more numerous riblets at aperture ....numerosum
  b''' 12 to 20 sharp riblets at apex, 25-48 at aperture, the interstices wider than ribs, concave; length 29-65 mm., 9 to 15 times the diam. agassizii
a' Shell with fine, evenly engraved longitudinal striae toward the apex (or in young specimens throughout); section circular
  b Apex simple; without apical slits; length 25-30 mm; 10 times diam. semipolitum
  b' Apex with slit on concave side; shell translucent whitish with opaque rings; length 30 mm, 16 times diameter .... inversum
  b'' Apex with slit on both concave and convex side; length 38.5 mm, 12 times the diameter .... hannai
  b''' Low rounded threads near apex some of which are more prominent; occurs in deeper water and are larger than above, vallicolens
a'' No longitudinal sculpture
  b. Strong and solid, young striated .... pretiosum
  b' Quite thin; deep water species; no apical notch
    c. Slender with very slight curvature, and slow increase
      d. Very slightly curved, very slender; length 30 mm, 16-19 times the diameter .... watsoni
      d' Almost straight, very glossy; length 30-40 mm, 12-15½ times the diameter .... rectius
      d'' Curvature regular but slight; length 45 to 69 mm, 11 to 14 times the diameter .... dalli
  b'' Shell subcircular in section
    c. Well curved, polished, flesh-tinted toward the apex, which is sometimes slit in front and behind; length 45 mm, 12 timms the diameter .... splendidulum

In taking up our discussion of the species the following note is of interest from a letter of Dr.A. Myra Keen (Per. Comm. Jan.1945) " I was surprised to find how few of the scaphopods have definite type localities. Dr. Pilsbry in the Pilsbryand Sharp monograph cited types for most of the species but neglected to tie type to locality. A check of specimens, most of which are in the National Museum will be necessary. I caught a few of them while I was there but evidently didn't have time to be thorough on anything but pelecypods."

Dentalium neohexagonum Pilsbry and Sharp,1897. " Monterey to Guacomayo, Central America" (Dall). Type locality not given (several localities in southern California cited).

Collecting data: This is our common siz sided species. It is often spoken of as a shallow water species. However, we have dredged it from as shallow as a few fathoms off shore to as deep as 100 fathoms off Redondo Beach. The deeper water specimens are as a rule larger. The species is very abundant in some of the Pleistocene deposits.(Burch);25-40 fms. Monterey; 50 fms. off Ensenada,Mex.; Malaga Cove in 15 fms.; San Pedro in 25 fms.; Rocky Pt. in 40 fms.; (Burch); 9-40 fms. in Monterey Bay, abundant (Smith); 12-15 fms. San Diego; 5-10 fms. off S. Coronado Id. (Baker); San Pedro

in 20 fms. (Lowe);

An interesting short paper on this species is D.K. Greger, " Notes on a collection of Dentalium neohexahonum P. & S.", Geological Mag., vol. 71, May 1934, pp 236-7.

Dentalium oerstedii Morch,1861. Pilsbry and Sharp in their monograph list this species from Guaymas to Panama and the Galapagos. It is of interest to us because of the possibility that the species we know as numerosum may be no more than subspecifically distinct if that. Pilsbry and Sharp discuss the species at length pp.24,25 and pl. 10, figs. 60,61,62,63,64. The original description is not published in Oldroyd and for convenience the translation of Morch's diagnosis in Malak. Blatter, vii, p.177(1861) follows: " Shell arcuate, rather solid, somewhat shining white or yellowish, hexagonal at apex. Aperture circular,having 12 lirae, the interstices smooth posteriorly, but toward the middle divided by a riblet, whence to the aperture there are 24 lirae. Growth lines here and there more raised, nearly variciform. Length 27, diam. 3 mm."

Dentalium numerosum Pilsbry and Sharp,1897. Redondo Beach, Calif. (Burch) to Panama and the Galapagos (Dall). Type locality fide Oldroyd is Coronado Islands. However, Dr. A. Myra Keen suggests " Type locality not specified; probably Cerros Island, 44 fathoms".

This species is usually assigned to Dall as author, but having been first published in the Manual of Conchology, vol.17 it seems that it should be written D. numerosum Pilsbryand Sharp,1897, ex Dall MS.

The description of this species as published by Pilsbryand Sharp is reprinted in Oldroyd vol.II, p. 12 with the exception of the following note " This name, which Dall used to cover the entire species, as found from Lower California to the Galapagos, may be utilized in a restricted sense for the northern form." Pilsbry and Sharp considered numerosum as a variety of oerstedii.

Collecting data: Redondo Beach, Calif. in 25 fms. gravel and in 75 fms. fine gravel and mud; Todos Santos Bay, in 50 fms.; (Burch); South Coronado Island in 18 fms. (Dr. F. Baker); Acapulco in 20 fms.; Guaymas in 20 fms ; Pta. Penasco in 10 fms.; Conception Bay in 15 fms.; Magdalena Bay in 10 fms. (Lowe);

Dentalium agassizii Pilsbry and Sharp, 1897. " Santa Barbara Islands, Calif to Panama" (Dall). Type locality, Gulf of Panama.

The reason this species has not been reported by any of our members is no doubt that it is below our deepest dredgings. The California records given by Pilsbry and Sharp are " Santa Barbara Islands, Calif.,414 fms.; off San Diego, Calif. 822 fms."

Dentalium semipolitum Broderip and Sowerby,1829. Monterey, Calif. (Allyn Smith) to San Lucas, Costa Rica (Valerio). Type locality, not specified .

This is our common round form with striations near the apex which dissapear toward the aperture.

Collecting data: Off Redondo Beach in 25 fms.; Horshoe Kelp off San Pedro, Calif. in 25 fms.; (Burch); Monterey Bay in 9-35 fms. in coarse to fine sand, scarce (A. Smith); San Juan del Sur, Nicauragua; San Pedro, Calif. in 20 fms.; (Lowe); San Felipe, L.C. (F. Stephens); Pta. Penasco, Sonora,Mex. (Huey); Acapulco, Mexico (Dr. B.R. Bales); South Coronado Island in 18 fms. (Dr. F. Baker).

Dentalium hannai Baker,1925. Proc. Calif. Acad. of Sci., Fourth Series, Vol. 14, No.4, pp. 83-87, pl. 10, July 23,1925. Type locality, off South Coronado Island.

This species is said to differ from semipolitum only in having a slit at the apex. It has been very generally placed in the synonymy of semipolitum Mr. George Willett states that out of 25 specimens taken off San Pedro, 9 were hannai and 14 were semipolitum. Mr. Willett suggests that the slit may

be but a secondary sex character. However, there are discussions of these slits in other periodicals giving a number of explanations. Mr. Allyn Smith sent in the following note: In 1939, Dr. Pilsbry wrote, in answer to a question:" The apical slit is apparently not sexual, since it is invariably present in some species, never present in some, and occasional in others, and of very variable length. Moreover, no special organ leads to it. Anal and sexual excretion is into the posterior cavity of (the) mantle, whichopens by a circular orifice in some, a notched one in other forms. Slits seem to have little significance in many species, and I agree that D. hannai is not specifically distinct from semipolitum as the only difference seems to be the slit. D. inversum, with slit on the concave side, seems distinct, though a few show no slit." (Letter, 31-I-1939). He also says that the slit " is not comparable to an aperatural sinus, such as the slit of Pleurotomaria or Turridae, as it is formed by dissolving away at the small end of the shell as the animal grows, and this process seems to act irregularly."

While we are disposed to consider hannai identical with semipolitum it has been our custom to copy the original descriptions of all species not included in Oldroyd. Therefore Dr. Baker's diagnosis of hannai follows: " Shell moderately curved, of medium size, very narrow at the apex but increasing rather rapidly at first, less decidedly later; length about 12 times the diameter, translucent, shining, blue-white at the anterior end and becoming slightly creamy on the posterior half; sculpture of the earlier third consisting of 28 fine,sharp,subequal ribs about a third as wide as interspaces, and all continuous, but gradually fading out at about a third of length of shell; growth striae wavy and irregularly marked throughout; anal aperture, a slit on both convex and concave sides, but shorter and rounded on the latter, sharply pointed on the former; sides of apex grown inward, the slit occupying about a third of the diameter at this point; these inward projection of shell substance can hardly be called " a plug" in the sense that this word is commonly used in Scaphopoda; aperture circular, intersecting the axis at a right angle; peristome thin. Length 38.5 mm.; diameter of base 3.2 mm; diameter of apex o.6 mm.; length of slit, convex side, 1.5 mm, concave side o.6 mm."

Collecting data: San Pedro, Calif., Malaga Cove, L.A. Co., Calif. in 10 fms.; S. Coronado Island in 15 fms. (G. Willett); San Diego,Calif. in 20 fms. and Coronado Islands in 10-14 fms. (Dr. F. Baker).

Dentalium inversum Deshayes,1825. " Bering Sea to Panama in increasingly deep water" (Dall,1921). Type locality unknown. Type said to be in Paris. . This species was not figured by Mrs. Oldroyd nor mention made of the fact that it is well figured by Pilsbry and Sharp in their monograph on p.95, pl. 21, figs. 47-49.

Miss Viola Bristol of the San Diego Museum sent in the following note " Dr. Fred Baker in one place in his index said " The description except the slit seems more like D. sectum. It could be new". In another place he said " A fact not noted by Pilsbry and Sharp is that the slit instead of being centered on the concave side, is always slightly to the right when the shell is held with the tip away and concave side up."

However, the above note does not mention the characters described for D. sectum in regard to the " narrow slit across an obliquely conic,smooth plug". It is generally considered that inversum is a distinct species.

Collecting data: Jalisco,Mexico in 30 fms. (G. Willett); Acapulco in 20 fms; Mazatlan and Manzanillo in 20 fms.; Magdalena Bay in 10 fms.; San Felipe; Conception Bay in 15 fms.; San Carlos Bay; Pta. Penasco in 10 fms.; (Lowe); Gulf of California (Baker).

Dentalium fisheri Pilsbry and Sharp,1897, ex. Stearns MS. This species was listed by Dr. Dall in Bulletin 112 but the consensus of opinion is that it is of the southern fauna and not of California.

Collecting data: Pta. Penasco, Sonora in 10 fms.(Lowe); Tres Marias Islands (Baker).

Dentalium vallicolens Raymond,1904. " Fuca Strait to Gulf of California" (Dall,1921).

Mrs. Oldroyd gives the type locality of the species as " Station 12, submerged valley off Redondo Beach,Santa Monica Bay in 145 fms." This was the first locality mentioned by Raymond. However, he did not designate it as the type locality. Dr. Fred Baker in Proc. Calif. Acad. Sci. 4th ser. vol.14, no.4, p. 85, pl.10 figures specimens from off La Jolla, Calif. in 110 fms. and designated them as types (No. 1758 in the Calif. Academy). Dr. Baker stated that Raymond designated no type material. Dr. A. Myra Keen advises on this " Dr. Baker was correct in saying that no types or type locality was designated, and the material he selected will stand. Mrs. Oldroyd always assumed in such a case that the first locality cited was automatically the type locality; hence the numerous changes I have had to indicate in these notes. Raymond happened to describe the Redondo locality first, as she quotes it, but he does not indicate this as the type area."

This is our largest species and has longitudinal striations that fade out anteriorly.

Collecting data: Off Redondo Beach, Calif. in 50 to 125 fms. in mud and gravel. This species was to be found in a certain type of bottom composed of fine gravel and mud. We could tell before we washed it, the second we saw the dredge come up, whether or not we had vallicolens material as we came to call it. Another odd thing is that these localities are very limited in extent and difficult to locate. We had our bearings laid out with care and would take shots at all of our land marks with the sextant and at the exact spot drop our dredge with the result that if we hit the spot one time out of five we were doing well. The boat would drift a very little and the adjoining material seemed to be barren comparatively. It should be mentioned that this vallicolens material carried a very rich fauna in addition to the Dentalium. (Burch). ; off San Diego in 120 fms. (Baker); : 161-265 fms. off Point Pinos, in mud (USFC Sta. 4462), a fragment; two specimens from off La Jolla in 100 fms.(A. Smith).

Dentalium pretiosum Sowerby,1860. Forrester Island, Alaska to San Diego. The variety indianorum Carpenter is placed in the synonymy by most authors.

There has been a great deal written about the use of this species by the Indians as money. However, Dr. A. Myra Keen in a recent letter gives a new story about it " Concerning habits of Dentalium pretiosum: According to A.P. Kashevaroff, Curator and Librarian at the Alaska Historical Library and Museum, (letter dated Dec. 16,1936), this shell was widely used by the Indians in trade as far north as Point Barrow and eastward to Diomede Islands. The Russians used it for trade with the aboriginees of Alaska and a string 18 inches long was worth a whole sea otter skin. Often too, the shells were sewed to clothing. The greatest use was around southeast Alaska. In Klebnikov's biography of Alexander Baranoff the following manner of procuring the shell is cited: " Some dead body of a slave or animal was thrown into the lake where it was left for a number of days and that mollusk would feed on the dead body and would get attached to the meat in great numbers. After the body was pulled out the mollusk was gathered."

This sounds a little peculiar in view of the fact that Pilsbry says the Mediterranean form shuns any kind of mud containing decomposition products and that it prefers clean and rather coarse sand. Also the reference to a " lake" is puzzling. Perhaps more than one kind of mollusk was used as wampum."

Collecting data: Forrester Island, Alaska; Sitka, Alaska in 10 fms.; Catalina Island in 60-80 fms. (G. Willett); Strait of Juan de Fuca (Eyerdam); Puget Sound (Dr. E. Baker); off Monterey(Cooper). 20 fms. off Carmel (Stillwater Cove), in sand; rare (A. Smith)- " The Carmel specimens are longer, more slender, more widely curved, and more pointed than typical shells from Alaska. One has a slit on the outside of the curve, a feature not present in any pretiosum I have seen. They hardly seem like pretiosum

and I have only tentatively labeled them as such. I have seen no typical pretiosum from Monterey."

Dentalium rectius Carpenter,1864. " Stephens Passage, Alaska to Panama Bay" (Dall,1921). Type locality, Puget Sound.

Collecting data: Off Redondo Beach, Calif. in from 25 to over 100 fathoms in mud bottom. Most abundant around the 50 fathom mark.; Todos Santos Bay in 50 fathoms mud; (Burch); Craig, Alaska in 50 fms. (up to 68 mm); Wrangel, Alaska in 50 fms.; San Pedro, Calif. in 100 fms.; (G. Willett); San Juan Islands, Wash. (W.J. Eyerdam); Orcas Island, Puget Sound in 10-30 fms.(Dr. F. Baker); DeCourcany Id., B. Columbia in 30 fms. (Oldroyd); 35-70 fms. in mud in Monterey Bay, common (A. Smith).

Dentalium watsoni Pilsbry and Sharp,1897. " Tillamook, Oregon to San Diego" (Dall,1921). Type locality not specified.

This species is described as being longer and more slender than rectius. Pilsbry and Sharp state " As straight as D. rectius but very much more slender. " We have specimens so labelled from off Redondo Beach in 125 fathoms. It is interesting to note that these exceptionally long shells came from deeper water. Our set labelled watsoni has been the source of a great deal of discussion by the local members of the club. Mr. George Willett submitted a set of rectius from Alaska. An interesting observation of both Mr. Willett's set and our set from off Redondo Beach is that the long specimens from either set will fit the described measurements of watsoni (16-19 times the diameter) but if you break off one of the long specimens at the right spot you then have the measurements of rectius(12-15½ times the diameter). Young specimens measure rectius and the older ones measure watsoni. Therefore, the theory is advanced that after a specimen of rectius attains a certain size and continues to grow, the growth in diameter does not increase in proportion to the growth in length resulting in watsoni. There may be other differences between these species. None of us have seen the type, and the above statement is made merely as an observation rather than an effort to question the validity of the species.

Dentalium dalli Pilsbryand Sharp,1897. " Pribilof Islands, Bering Sea to Point Aguja,Peru " (Dall,1921). Type locality not specified.

Collecting data: Drier Bay, Knight Id., Pr. Wm. Sound, Alaska in 15 fms. mud, 1923 (W.J. Eyerdam); Jesse Island, British Columbia,Alaska (Lowe) Shaw Island, Puget Sound in 30 fms.(Oldroyd); Lower Calif. (Baker).

Dentalium splendidum G.B. Sowerby,1832. Proc. Zool. Soc. London,1832,p.29. Figured in - . Thes. Conch.,iii,p.98,pl.225,f.41; Conch. Icon. 18 pl.5,f.30; Pilsbry and Sharp, Manual of Conch. vol.17,1897,p.96, pl.15,f.38. The original description follows: " Dent. testa tenui,polita,basi carnea, apice majori lactea; apertura postice fissuris duabus, altera dorsali,altera ventrali: long. 1 8/10, lat. 3/20 poll. Hab. ad oras Americae Meridionalis. (Xipixapi, West Columbia (i.e. Ecuador). Dredged in from ten to sixteen fathoms water, on a sandy muddy bottom.

There is no definite record of this species in our fauna. However, Mr. George Willett has taken specimens in 25 fms. off South Coronado Island that are close to this species and may be so classified. Therefore the above references are included for convenience of those interested.

Family SIPHONODENTALIIDAE

The family Siphonodentaliidae contains three genera, Entalina, Siphonodentalium, and Cadulus

Entalina and Siphonodentalium have the greatest diameter at the aperture; Cadulus has the section of greatest diameter or equator, posterior to the aperture. The angled apex and sculptural features of Entalina suggest a true Dentalium but the form of the foot and other anatomical features indicated a position under Siphonodentaliidae. We have no representative of this genus described from this coast.

Siphonodentalium is a widely distributed genus of few species confined to deep water except in high latitudes. Dall,Oldroyd and others place Cadulus quadrifissatus Pilsbry under the genus Siphonodentalium in spite of the fact that it was described as a Cadulus by Pilsbry and definitely

does not answer the description of a Siphonodentalium as the largest diameter is not at the aperture. Another ~~factor pointin~~g away from Siphonodentalium is the shallow water in which it is found-- 10 fathoms up. Henderson records the East American species as ranging from nearly a hundred fathoms to well over a thousand fathoms with most coming from around five hundred fathoms. Perhaps when more dredging has been done at these depths corresponding species may be found.

Genus Cadulus Philippi,1844. Type (by subsequent designation,Hermannsen,1846), Dentalium ovulum Philippi.

As a rule the species of the genus Cadulus are not very widely distributed. The aperture is usually somewhat contracted, usually very oblique, and never the section of greatest diameter of the shell. The genus has been divided into subgenera which Henderson says are of doubtful value. In a general way it may be said that the large and medium sized species fall under Platyschides, the small and slender forms under Gadila, and the small bulbous species under Cadulus s.s., while those of very prominent apical slits are Polyschides. (Henderson).

Almost all of our species of Cadulus belong to the subgenus Gadila; Cadulus californicus is a Platyschides; and Cadulus quadrifissatus is a Polyschides.

Key to Species of Cadulus

a. Posterior end with notches or slits
  b. With 4 slits; shell slowly tapering, hardly inflated, quadrifissatus
  b'. With 2 slits; shell stout and inflated; largest equator nearer aperture and more distinct than in C. tolmei, californicus
a'. Posterior end without notches or slits
  b. Shell rather stout; equator further from aperture and less distinct than C. californicus .... tolmei
  b'. Very slender with slight inflation anterior; contraction toward the mouth very short,
    c. Shell smooth throughout,
      d. Length 13.5; 10 x diameter .... aberrans
      d'. Length 10.3; 9 x diameter .... fusiformis
      d''. Length 10; 7 x diameter .... hepburni
      d'''. Length 8.6; 4½ x diameter .... stearnsii
    c'. Shell circularly corrugated near apex, perpusillus

Cadulus quadrifissatus Pilsbry and Sharp,1898, ex Carpenter MS. Monterey (Keen)(Perry) to Tres Marias Islands (Hanna and Strong). Type locality, San Diego, Calif. in 10 fms.

This species is easily recognized by the prominent apical slits. Dr. A. Myra Keen (Per. Comm. Feb. 1945) " I agree that this should probably be returned to Cadulus." The species is almost identical with the C. quadridentatus of ~~the Ane~~tillean fauna.

Collecting data: Off Malaga Cove, L.A. Co., Calif. in 10 fms.; off Redondo Beach in 15-25 fms.; Avalon, Catalina Id. in 25 fms.; Ensenada,Mex. in 10 fms.: (Burch); San Pedro, Reef Point, South Coronado Id. in 10-20 fms.(G. Willett); San Pedro in 30 fms. (Lowe); Del Mar, Calif.(Stephens); San Diego (Hemphill); S. Coronado Id. in 6 fms., also 10 fms.; Coronado Beach in 7-14 fms.; Ballast Piint,San Diego Bay (Baker).

The species seems to prefer shallow sandy bottom rather than mud.(Burch Specimens from different localities show a great deal of variation. It is probable that a specialist on the group will sooner or later divide this species into several species or subspecies. (Burch).

Cadulus californicus Pilsbry and Sharp, 1898. " Clarence Strait, Alaska to Manta, Ecuador" (Dall,1921). Type locality: Station 2923, off San Diego, Calif. in 822 fathoms.

There has been a great deal of confusion regarding this species and C. tolmei. It is the largest described species from our fauna. Pilsbry and Sharp state, p. 181 " A large stout species, much exceeding C. tolmei, C. clavatus and C. dalli in size, and more swollen and robust than either. The equator is nearer the aperture and more pronounced than in C. tolmei." However, the remarkable differences between authentic specimens of this species add to the difficulties. Pilsbry and Sharp, p. 181 state " It varies considerable in inflation, some specimens (f.8,7) being decidedly less swollen than that selected as type (f.5,6.)". Tom Burch in Min.21, p. 8, states " Cadulus tolmei is described as having a simple apex, while Cadulus californicus is described as having a notched apex. If the tip of a specimen of Cadulus californicus were broken off, it would answer the description of Cadulus tolmei perfectly. The Lowe collection in the Natural History Museum of San Diego has three specimens labelled Cadulus californicus from 60 fathoms off San Diego, and four specimens labelled Cadulus tolmei from 634 fathoms off San Diego. The latter appear to me to be merely Cadulus californicus with the tips broken off which gives them the appearance of having the equator further posterior. Only one specimen of Cadulus tolmei seemed to be a live specimen and it was obviously broken."

Collecting data: Dredged in abundance off Redondo Beach in 150 fathoms mud with an occasional specimen showing up in material from as shallow as 75 fathoms (Burch); off Catalina Island in 200 fathoms (G. Willett); Point Loma, San Diego in 62 and 80 fathoms (Baker).

Cadulus tolmei Dall,1897. - " Vancouver Island to San Quentin Bay, Lower California" (Dall, 1921). Type locality, Victoria, B.C. in 60 fms.

Dr. Dall's original description of this species is republished in Oldroyd, vol.2, p.16 and Dall's figure reproduced Pl.1, fig.9. No reference is made to the fact that the species was redescribed and refigured by Pilsbry and Sharp p. 181,182, pl.34, figs. 1-4. It is interesting to note that not only do the two figures seem to differ slightly but that the published dimentions of the specimen figured by Pilsbry and Sharp differ somewhat from Dall's dimentions. The Pilsbry and Sharp figures are very clear though and should be studied by those interested in the species.

Collecting data: Off Redondo Beach in 150 fms. mud bottom (Burch); Catalina Island in 200 fms. (G. Willett); 634 fathoms off San Diego (Lowe); 627 fms. off Monterey, in blue mud (USFC Sta. 3228) rare (A. Smith).

Cadulus tolmei newcombei Pilsbry and Sharp,1898. Man. Conch. vol.17, p.182, Pl.34, f. 1,2. Type locality, same as tolmei above.

This variety seems to have been rather generally ignored. Most authors do not even mention it in the synonymy. However, H.N. Lowe and others have considered it a good subspecies. Mrs. Oldroyd did not mention it. The original description follows: " About the length of tolmei, but decidedly more slender, greatest diameter contained nearly 6 times in length, section of the tube markedly oval, compressed vertically throughout; aperture oval. Length 11.0; antero-posterior diam. at aperture 1.45, at greatest bulging, 1.66, at apex o.66 mill.; lateral diam. at aperture 1.55, at largest 1.9, at apex o.75 mill."

Collecting data: Charter Bay, British Columbia (Lowe).

Cadulus aberrans Whiteaves,1887. Quatsino Sound, British Columbia to San Clemente Island, Calif. (Lowe). Type locality, Quatsino Sound, B.C.

Mrs. Oldroyd gives the original description of this species but no figure. It is figured by Pilsbry and Sharp pl.35, fig.16. In connection with the description Whiteaves made the following comments which are not reprinted in Oldroyd:" This little shell, which is, nevertheless, of large size for the genus, looks not unlike an immature Dentalium, and, at first sight, specimens of it might easily be mistaken for half-grown examples

of D. pretiosum Nuttall, which the Indians say occurs at the same locality. It may,however, be distinguished from any Dentalium by its thin test and highly polished outer surface, though the swelling of the shell in advance of the middle and the constriction behind the aperture which are usually marked characters in the genus Cadulus, are reduced to a minimum in this species, and in most specimens are quite imperceptible."

C. aberrans,fusiformis, and hepburni are very much alike and the difficulty in this group is to avoid confusing these three species.

Collecting data: We have specimens which have been tentatively assigned to this species dredged off Redondo Beach in 25 fathoms. They have not been compared to type specimens.(Burch); off San Clemente Island, Calif. (H.N. Lowe); Departure Bay, B.C. (Lowe);

Cadulus fusiformis Pilsbry and Sharp,1898. " Monterey, Calif. to Cape San Lucas" (Dall,1921). Type locality, San Pedro, Calif.

Collecting data: Monterey, Calif. in 10-25 fms.; Redondo Beach in 25, 50,75, and 100 fms.; Santa Monica, Calif. in 15 fms.; Malaga Cove, L.A. Co. in 10 fms.; Rocky Point, L.A. Co. in 40 fms.; Horshoe Kelp off San Pedro in 25 fms.; Todos Santos Bay in 50 fms.: (Burch); San Pedro and San Diego in 10-25 fms. (G. Willett); 10-40 fms. in Monterey Bay, in sand, abundant (A. Smith); San Pedro in 30 fms. (Lowe); San Diego in 15 fms.; Ballast Point, San Diego Bay in 5 fms.; off Hotel del Coronado in 12-15 fms.; Pacific Beach; (Baker).

Cadulus hepburni Dall,1897. Drier Bay, Knight Island,Alaska (Eyerdam) to Catalina Island, Calif. (Willett). Type locality, Victoria, B.C.

Mrs. Oldroyd reproduced the original figure on pl.1,f.13. The species was redescribed by Pilsbry and Sharp, p.194 and refigured pl.35, f.19,20. " The contraction toward the aperture is very slight, and mainly confined to the convex side." " While quite slender, it is still somewhat stouter than C. aberrans; and C. fusiformis is less curved and less constricted at the aperture." A study of this contraction toward the aperture brings out some very puzzling variations.

Collecting data: Drier Bay, Knight Island, Alaska (W.J. Eyerdam); Forrester Island, Craig,Ketchikan, Alaska in 20-40 fms. (Willett); Catalina Island in 30 fms. (Willett); 43-45 fms. off Santa Cruz, in soft green mud (USFC Stas. 4482,4483). Also , 80 fms. off Point Pinos, a single specimen (Gordon); " A very scarce species, apparently in Monterey Bay" (A. Smith).

Cadulus stearnsii(Pilsbry and Sharp),1898. " British Columbia to San Quentin Bay, Lower California" (Dall,1921). Type locality, off Tillamook Harbor, Oregon.

? Cadulus

This species was described in the Pilsbry and Sharp monograph, p.125 as Dentalium simplex Pilsbry and Sharp, and on page 253 they renamed it D. stearnsii because the name simplex was preoccupied by D. simplex Michelotti,1861. It was figured on pl.27, figs. 88,89.

Collecting data: Off Redondo Beach in 75-100 fms.; off Rocky Point, Los Angeles Co. in 40 fms. mud bottom (Burch).

Cadulus perpusillus Sowerby,1832. " Monterey, Calif. to Panama" (Dall) Dr. A. Myra Keen advises that Dall also reported the species from Guayaquil making the range -3 to 37. Type locality is Puerto Salango,Ecuador.

If this species has ever been figured anywhere we have failed to find the record of it. It was unfigured in the original publication and Pilsbry and Sharp do not figure it. They discuss it on p. 190,191. It is in the group of C. dentalinus. The first inclination on sight is to put specimens of this species in with the Caecum. It is transversely striate. Pilsbry & Olsson, Proc. Acad. Nat. Sci. Phila. vol. 93,p 49,1941 discuss this species placing it under the subgenus Gadilopsis. It is surprising that it is not in a distinct genus.

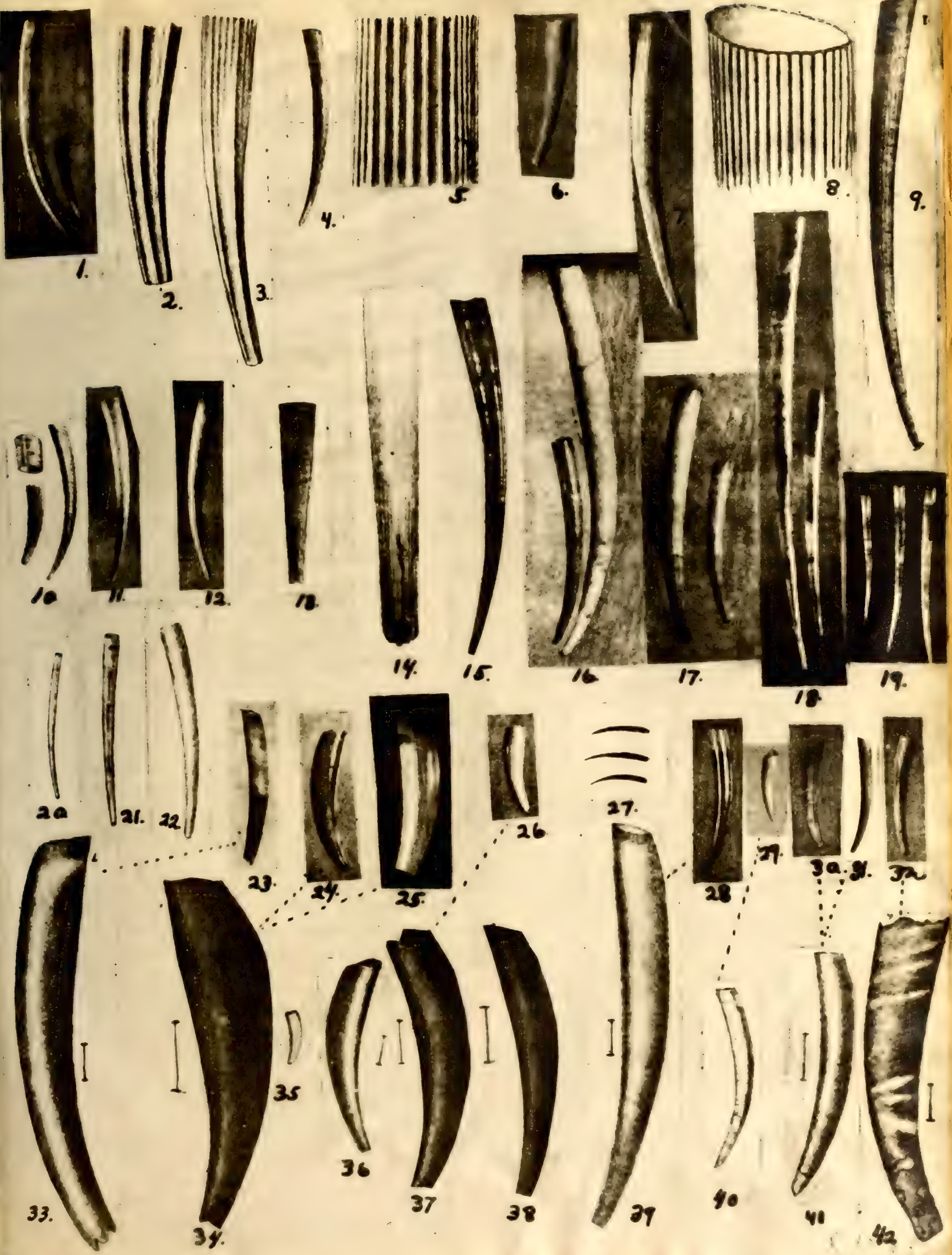
Collecting data: Off Redondo Beach, Calif. in 25-50 fms. (Burch); 36-39 fms. off Point Pinos, in soft green and dark gray mud and rocks (USFC Stas. 4464,4483) scarce (A. Smith).

Figure EXPLANATION OF PLATE

1. Dentalium neohexagonum Pilsbry & Sharp- 25 fms. Redondo Beach, Calif. gravel and sand bottom- length of larger specimen 35 mm. pp.9,10.
2. Dentalium neohexagonum Pilsbry & Sharp- Manual of Conch. v.17,pl.11,f.76
3. Dentalium numerosum Pils. & Sharp- " " " pl.10,f.71
4. " " " " " " f.72
5. " " " " " " f.73
6. " " Coronado Island,18 f. (Baker Coll.) 11 mm.
7. Dentalium oerstedii Morch,-Guatulco Bay,Mex. 30-40 f.(Willett) 24 mm(yng.
8. Dentalium agassizii Pils. & Sharp- Manual of Conch. vol.17,pl.12,f.90
9. " " Oldroyd, vol. II, pl.1, f.1.
10. Dentalium semipolitum Brod. & Sby.- Manual of Conch. vol.17, pl.16,f.54
11. " " Acapulco,Mex. (Bales Coll.) 27 mm.
12. " " San Pedro, Calif. (Willett) 28 mm.
13. Dentalium hannai Baker- Proc. Cal. Acad. Sci. vol.14,pl.10,f.5
14. Dentalium inversum Deshayes- Manual Conch. pl. 21, f.47
15. " " Tenacotita Bay, Mex. 30 f.(Willett) 30 mm.
16. Dentalium vallicolens Raymond-Redondo Beach,75f.MG(Burch) 60 mm.
17. Dentalium pretiosum Sby.- Forrester Island,Alaska (Willett) 38 mm.
18. Dentalium watsoni and D. rectius,Craig, Alaska (Willett) From set mentioned on p. 13. Long specimen 67 mm x 3.5 mm. length is 20 x diam. short specimen is 37 mm x 2.5 mm or 15 x diam.
19. Dentalium rectius Carpenter- Redondo Beach, 75 f. mud
20. Dentalium watsoni Pils. & Sharp- Manual of Conch., vol.17,pl.21, f.44
21. Dentalium rectius Carp.- " " " f.45
22. Dentalium dalli Pils. & Sharp- " " " f.46
23. Cadulus quadrifissatus Pils. & Sharp- Malaga Cove, 10 f,sand, 11 mm
24. Cadulus californicus Pils. & Sharp- Redondo Beach, 150 f, mud, 10 mm(Burch
25. " " but with portion of each end broken off 8 mm
26. Cadulus tolmei Dall (?), Catalina Island,200f (Willett), 6 mm resembles fig. of C. calif.more than C. tolmei.
27. Cadulus aberrans Whiteaves- C. hepburni Dall, & C. tolmei, from above downfrom photograph of specimens from type lots,natural size (D.K.Greger
28. Cadulus fusiformis Pils. & Sharp- Rocky Point,40f,mud, 11 mm (Burch).
29. Cadulus aberrans Whiteaves-(?) Departure Bay, B.C. 5.5 mm.
30. Cadulus hepburni Dall- (?) Redondo Beach 75 f mud, 8 mm (Burch).
31. " " from Timm's Point, San Pedro,Pleistocene 8.5 mm (Burch)
32. Cadulus stearnsii (Pils. & Sharp)- Redondo Beach, 75 f, mud, 9 mm(Burch
33. Cadulus quadrifissatus - Manual of Conch. vol.17, pl.29, f.10
34. Cadulus californicus- " " " pl.34, f.5
35. " " Oldroyd, vol.2, pl.1, f.8
36. Cadulus tolmei- Manual of Conch., vol.17, pl.34, f.3
37. " " Oldroyd, vol.2, pl.1, f. 9 (will some one check and see if this is actually Dall's original figure.)
38. Cadulus tolmei newcombei- Manual of Conch. vol.17, pl.34, f.1
39. Cadulus fusiformis- " " " pl.35,f. 14
40. Cadulus aberrans- " " " pl.35, f. 16
41. Cadulus hepburni- " " " pl.35, f. 19
42. Cadulus stearnsii- " " " pl.27, f. 88

PLATE I

SCAPHAPODA



THE PTEROPODS

by Dr. Joshua L. Baily Jr.

Perhaps the most problematic group within the molluscan phylum is that of the Pteropods. Cuvier, who originated the term, considered them to constitute a separate class of equivalent rank to the gastropods, and for a long time this view was commonly held, but not so much on account of the taxonomic value of the parapodia as to the fact that the relationships and resemblances of this group are so involved that it was impossible to assign them to any subordinate position beyond the possibility of reasonable doubt that it was the correct one. A later writer whose name I do not now recall united them with the Cephalopoda on the ground that certain fossil pteropods have concamerated shells, and that certain recent species have a terminal sucker which may be homologous to that of *Spirula*. Blainville considered them to be derivatives of the Nudibranchs, and Cooke, in the Cambridge Natural History considered them to be modified Tectibranchs. Pelseneer followed the latter course, but with this difference. He divided the pteropods into three groups, one of which he excluded entirely from the mollusca, and to the other two he assigns different positions in the taxonomic scheme,because he believes them to be not closely related. Finally, Sit D'Arcy W. Thompson has pointed out certain structural resemblances between this group and the Brachiopods. He does not suggest a relationship with the brachiopods, but the similarities which he points out are somewhat surprising.

Now there are good reasons for whichever view we choose to take as to affinities of the pteropods, so that before the true taxonomic relationships of the pteropods can be worked out all the evidence for any view must be sifted and evaluated. Unfortunately this is easier said than done.

The present writer has never seen a living pteropod, nor has he ever found a dead one. The only fossil pteropod that he has ever seen may turn out to be something else. His only knowledge of the group comes from the printed page, to which all readers of these notes have equal access. Therefore he does not feel competent to solve any problems, but he does feel competent to state what the problems are, and he feels that it is important that this be done.

The structure which gives the Pteropoda their name is the pair of parapodia, lateral extensions of the foot by means of which the animal is enabled to swim. But these parapodia are not peculiar to this group. They are well developed and very conspicuous in *Bulla gouldiana* and *Navanax inermis*, but in these two species they are not used for navigation but adhere closely to the back and sides of the animalin the position assumed by the lobes of the mantle of *Cypraea*, which they resemble. Some years ago the writer saw in a tank in the New York aquarium a pair of what we in California call "ink fish" but which in the east are called " sea pigeons", one of which undulated its parapodia, and by so doing swam upward to the surface, at an angle of about 45 degrees. He has never seen a California ink fish swim in this way and doubts whether it can do so. In the Treatise of Zoology already referred to there is a statement that other Tectibranchs can swim thus, and an illustration of a species of *Akera* doing it. Dr. A.W. Pillsbury, who specializes in moving pictures of unusual objects has exhibited an undersea picture of some pteropods of the genus *Cavolina* in motion, but in the interest of accuracy it must be said that the " wings" of this species do not undulate, but beat rigidly, like those of a butterfly, in which the entire wing moves in the same direction at the same time, whereas the undulations of the parapodia of the ink fish were a much more graceful motion, suggesting that of the folds of a flag flying in a breeze, which form at the flagpole and flow along the flag to the opposite margin.

In addition to their parapodial navigation, the pteropods exhibit other characteristics which resemble those of the tectibranchs. They have a euthyneuric nervous system. It will be recalled that Pelseneer divided the Gastropoda into two subclasses, the Euthyneura and the Streptoneura, which are based on the structure of the nervous system. The main nerve cord of the euthyneura is ring-shaped, but in the streptoneura the posterior part of the ring has been rotated about a longitudinal axis, so that the nerve cord is twisted into the form of the figure 8. The euthyneuric form is the more primitive of the two, and occurs in the primitive amphineura, but the euthyneuric gastropods that are alive today are a highly specialized group, and many of them pass through a streptoneuric stage in their embryological development, which indicates that their euthyneurism is a secondary condition derived from a streptoneuric ancestry. Borradaile and Potts state that in the two orders of the euthyneura, which are the opisthobranchs and the pulmonates, the euthyneuric condition has been arrived at in two different ways. In the opisthobranchiata there has been a detorsion which has restored the nervous system as well as the other organs of the pallial complex to a position approximate to that of their ancestral condition, while in the pulmonata the euthyneuric form has been brought about by the atrophy of the posterior loop. Consequently Borradaile and Potts believe that these two orders have not had a common origin and their inclusion in a single subclass is somewhat arbitrary and unnatural. They prefer the arrangement of Cooke in the Cambridge Natural History.

We need not speculate as to relationship of the opisthobranchiata and the pulmonata here, but we should note that in the opisthobranchiata the most primitive genus, *Acteon*, is streptoneuric, and further resembles the streptoneura in having an operculum. It probably represents the " missing-link" between the Preosobranchiata which are streptoneuric and the opisthobranchs. In the same way, one of the most primitive genera (but not *the* most primitive) of the pulmonata, *Chilina* is also streptoneuric, and to that extent probably resembles the ancestral pulmonate, which would seem to afford confirmation to Borradaile and Pott's suspicion that the pulmonates and the opisthobranchs are not specially closely related.

Now the euthyneuric nervous system of the pteropods has already been referred to, but it is a curious fact that in this group also the most primitive family, the *Spiratellidae*, (formerly called the *Limacinidae*) is streptoneuric. This family also resembles the streptoneura in having a spirally coiled shell, the only instance of this among the pteropods. This resemblance of the pteropods to the streptoneura militates against the theory that the pteropods are modified tectibranchs, for it would compel us to believe that in its evolutionary development the *Spiratellidae* had twice developed a streptoneuric nervous system, which seems highly improbable.

So far as the present writer is aware, no one has ever suggested that the tectibranchs might have been derived from the pteropods. This seems equally as unlikely as the inverse arrangement, as it would seem just as improbable that the *Acteonidae* should have twice acquired a streptoneuric condition as that the *Spiratellidae* should have done so. But Tryon, in his Structural and Systematic Conchology, hints that the systematic position of the *Acteonidae* is not beyond all possibility of a reasonable doubt. It may not be impossible that tectibranchs are a diphyletic group and that these with parapodia are derived from a pteropod ancestry. It does not become one who has no first hand knowledge of this group to advance any such revolutionary theory: the present writer refers to the possibility only to show how complex are the relationships which must be solved before the final systematic position of the pteropods can be considered fixed.

When we come to study the paleontology of the pteropods we find that instead of throwing light on the matter their paleontology only makes matters more complicated. The tectibranchs originated in the Mesozoic, while the pteropods which are supposed to have been derived from them, are reported to occur in the early Cambrian. An excellent picture of one of these Cambrian pteropods appears in the Encyclopedia Brittanica, 14th edition, under the article on the gastropoda. The general consensus of modern opinion seems to be that these so called pteropods are not even mollusca, but may be worms. In this case the parapodial arms may be homologous to the arms of the brachiopoda, and the present writer imagines that he can discern a resemblance to the plastron of the burrowing crab *Hippa analoga* in which case the arms coule be interpreted as oral appendages.

Of course, if the paleozoic pteropods are not even mollusca they can throw no light at all, either pro or con, on any theory of derivation of the pteropods, but if their molluscan affinities should eventually be upheld many deep seated changes in molluscan taxonomy would be involved. The resemblances between the paleozoic and recent pteropods are not with the primitive recent forms such as the *Spiratellidae*, but with the highly specialized forms, such as *Clio or Creseis.* Of course, nobody knows whether the paleozoic pteropods were euthyneuric or streptoneuric, but the fact that they resemble only the euthyneuric forms among the recent pteropods makes it almost impossible to conceive of the *Spiratellidae* as being the transition between the paleozoic and recent pteropods. If the paleozoic forms are considered the ancestors of the recent forms, it will be then practically inevitable that the *Spiratellidae* and perhaps the *Cavoliniidae* as well should be removed altogether from the pteropods and assigned to a position closer to the streptoneura than to the euthyneura.

To sum up the difficulties that confront the systematist who tries to settle the position of the pteropods we may say that it is impossible to include in a single group all of the species that have ever been considered to be pteropods. But we can say with certainty just which forms should be eliminated. We can say this much, however. If the *Spiratellidae* be eliminated we are faced with the necessity of finding a position somewhere else for them, as they are undoubtedly mollusca, but if the paleozoic forms be eliminated we are faced with no such responsibility, for if they are not pteropods they are not mollusca. The headache can then be passed on to the helminthologists. At present this seems to be the more populat solution of the problem, but it may possibly be popular only because it is easier. And if we doadopt it, that is not the end of our troubles, for in any case the relationship between the pteropods and the parapodiate tectibranchs presents difficulties of its own. A great deal of further study is needed before the pteropods can be assigned to a definite position in the taxonomic scheme.

In 1934 the Conchological Club of Southern California printed a paper by A.M. Strong which is now out of print and in great demand. We are here republishing the paper for the convenience of those unable to secure a copy of the original.

KEY TO THE PRINCIPAL GENERA OF MICROSCOPIC GASTROPODS OF THE WEST COAST OF NORTH AMERICA

Shell without a visible spire.
. Shell tubular, the apex closed by a plug.
.. Surface smooth .... Fartulum (18)
.. Surface sculptured with raised rings only.
... Rings strong, 40 or less in number .... Caecum (18)
... Rings fine, 75 or more in number .... Micranellum (18)
.. Surface sculptured with raised longitudinal lines only
Elephantulum (18)
.. Surface sculptured with both rings and longitudinal lines .... Elephantanellum (18).
. Shell cylindrical or ovate, spire infolded.
..Columella with 1 or 2 faint plications or none.
... Apex ending in a more or less distinct spire .... Volvulella (1)
... Apex rounded with a pit or indentation .... Cylichna (1)
.. Columella with several sharp plications .... Cypraeolina (1)
Shell with a visible spire.
. Aperture long and narrow.
..Spire flat or exposed in an umbilical pit.
... Columella thickened, frequently with a fold ..... Retusa (1)
... Columella thin, without a fold .... Diaphana (1)
.. Spire elevated, more or less pointed.
... Columella with 1 or 2 indistinct folds .... Acteocina (1)
... Columella with 3 or more distinct plications .... Marginella (1)
. Aperture oblong or rounded.
..Aperture with a distinct canal or distinct notch.
... Shell sinistral .... Triphora (3)
... Shell dextral.
.... Aperture with a sinus at or near the suture .... Manhilia,etc. (1)
.... Aperture without a sinus.
..... Shell slender, tapering.
...... Columella with a strong fold .... Eumeta (7)
...... Columella smooth.
.... Spiral sculpture of smooth cords .... Seila (1)
.... Spiral sculpture strongly nodulose.
.... Aperture deeply notched but without canal...... Metaxia (1)
.... Aperture with a short, nearly straight canal... Cerithiopsis (9)
..... Shell ovate, covered with a heavy epidermis ..... Trichotropis (1)
.. Anterior end of aperture produced, more or less notched.
... Operculum multispiral, with a central nucleus .... Tachyrhynchus (1)
... Operculum paucispiral, with a lateral nucleus.
.... Inner lip partly detached from the body whorl .... Diastoma (8)
.... Inner lip appressed to the body whorl.
..... Aperture decidedly produced anteriorly .... Bittium (10)
..... Aperture slightly produced anteriorly .... Alabina (6)
.. Aperture entire, without anterior canal or notch.
... Nuclear whorls sinistral, set at an angle.
....Columella with 3 plications .... Pyramidella (4)
.... Columella with 1 plication .... Odostomia (4)
.... Columella without visible plications .... Turbonilla (4)

... Nuclear whorls dextral.
....Nuclear whorls slender, always cast off in the adult.. Truncatella (1)
.... Nuclear whorls retained in the adult shell.
..... Shell elongate, slender.
...... Surface smooth and highly polished.
.... Shell umbilicated .... Niso (15)
.... Shell not umbilicated.
.... Inner lip free, not appressed to the body whorl ... Haliella (15)
.... Inner lip appressed to the attenuated base.
.... Shell colored or with colored markings .... Strombiformis(15)
.... Shell uniformly white, straight or curved .... Melanella (15)
...... Surface with numerous, irregular, swollen varices ... Alaba (5)
...... Surface with regular axial ribs or sharp varices.
.... Aperture round with the inner lip continuous .... Epitonium
.... Aperture ovate, outer lip more or less thickened .... Rissoina (14)
..... Shell ovate or globose.
...... Aperture nearly filled with teeth .... Pedipes (1)
...... Aperture open.
.... Operculum calcareous, solid .... Tricolia (Phasianella)19
.... Operculum not calcareous.
.... Shell fairly thick and strong.
.... Surface smooth or finely striate.
.... Aperture separated from the columella by a shelf
.... Amphithalamus(11)
.... Columella narrow.
.... Nuclear whorls smooth .... Syncera (17)
.... Nuclear whorls thimble pitted.
.... Periphery sharply angulated .... Diala (1)
.... Periphery rounded .... Barleeia (17)
.... Surface sculptured.
.... Columella with a central swelling or tooth .... Iselica (1)
.... Columella smooth.
.... Shell umbilicate, aperture semilunate .... Fossarus (1)
.... Shell not umbilicate, aperture rounded .... Alvania (13)
.... Shell thin and delicate.
.... Aperture semilunate, umbilicus lacunate .... Lacuna (1)
.... Aperture broadly oval, umbilicus small or none.
.... Shell of many whorls .... Cingula (12)
.... Shell of few whorls ....Rissoella (17)
..... Shell turbinate or depressed.
...... Operculum calcareous,solid ..... Homalopoma (Leptothyra) (1)
...... Operculum not calcareous.
.... Interior of aperture brilliantly nacreous ..... Margarites)1)
.... Interior of aperture dull or slightly nacreous.
.... Aperture nearly circular, lip thickened.
.... Shell white or maculated .... Liotia (20)
.... Shell uniformly brown ....Heliacus (1)
.... Aperture rounded, lip thin, shell white, vitreous.
.... Umbilicus covered by a callus pad .... Teinostoma (1)
.... Umbilicus open.
.... Outer lip sinated in the middle .... Scissilabra (2)
.... Outer lip not sinated.
.... Spiral sculpture absent .... Vitrinella (2)
.... Spiral sculpture present.
.... Many equal spiral threads or incised lines .. Delphinoides (2)

.... One to six spiral keels.
.... Axial sculpture absent .... Circulus (2)
.... Axial sculpture present ....Cyclostrema (2)

List of Publications

1. Descriptions scattered through many publications.
2. Vitrinellidae. Proc. U.S. Nat. Mus. vol.32, No. 1520; vol.39 , No.1785 (These do not give the numerous species described by Carpenter and Adams).
3. Triphora. Proc. U.S. Nat. Mus., vol. 33, No. 1569; Proc. Cal. Ac. Sci. 4th Ser. Vol.15, No.6.
4. Pyramidellid Mollusks. U.S. Nat. Mus. Bulletin 68; Proc. vol.42, No.1903; vol.52, No. 2193; vol.70, No. 2660; Proc. Cal. Ac. Sci. 4th Ser.,vol. 17, No.7.
5. Alaba. Proc. U.S. Nat. Mus., vol. 39, No. 1781.
6. Alabina. Proc. U.S. Nat. Mus. vol. 39, No. 1790.
7. Eumeta. Proc. U.S. Natl. Mus., vol. 39, No. 1799.
8. Diastoma. Proc. U.S. Nat. Mus., vol. 39, No. 1802.
9. Cerithiopsis. Proc. U.S. Nat. Mus. vol. 40, No. 1823.
10. Bittium. Proc. U.S. Nat. Mus., vol.40, 1826.
11. Amphithalamus. Proc. U.S. Nat. Mus. vol.41, No. 1854.
12. Cingula. Proc. U.S. Nat. Mus. vol.41, Nos. 1858 and 1871.
13. Alvania. Proc. U.S. Nat. Mus. vol.41, No. 1863; Proc. Cal. Ac. Sci.,4th Ser., vol.19, No.4.
14. Rissoina. Proc. U.S. Nat. Mus., vol.49, No. 2094; Proc. Cal. Ac. Sci., 4th Ser., vol.19, No.4.
15. Melanellid Mollusks. Proc. U.S. Nat. Mus. vol.53, No. 2207.
16. Epitonium. Proc. U.S. Nat. Mus., vol. 53, No. 2217; Proc. Cal. Ac. Sc. 4th Ser., vol.19, No.5. (These do not contain a complete list).
17. Rissoellidae., Synceratidae and Barleeia. Proc. U.S. Nat. Mus., vol.58, No. 2331.
18. Caecidae. Jour. Wash. Ac. Sci., vol.10, No.20 (This does not contain the numerous species described by Carpenter and Adams).
19. Phasianella. Proc. Cal. Ac. Sci., 4th Ser., vol.17, No. 6.
20. Liotidae. Trans. San Diego Soc. Nat. Hist., vol.7, No. 37.

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Class GASTROPODA

Order PTEROPODA

" Pelagic animals in which the mid-region of the foot in its primitive condition, is relatively largely developed, and drawn out into a pair of wing-like muscular lobes, which are used as paddles."

" The Pteropods inhabit the high seas, floating constantly in the water by means of the lateral fins. They are extremely vivacious in their movements, and are frequently together in prodigious numbers" Sutter

Minutes # 46, pp 24,25,26 gave a clear discussion of the problems involved in this group. We have nothing to add to the article by Dr. Joshua L. Baily Jr. and will proceed with our distributional data. It is obvious that there is no subject more in need of the attention of a specialist. The literature is both scattered and confusing. Perhaps the fact that the experience of the Burches has been the same as that of other members will be self explanatory. In the course of our dredging and trawling operations covering a period of years we collected great numbers of Pteropods. The material was carefully preserved in alcohol, but we have never found a student interested in trying to classify our material. It is safe to state that there is no other order of mollusks characterized by such a general lack of information.

Suborder Thecosomata Blainville

Pteropoda provided with a delicate hyaline shell developed on the surface of the visceral hump.

Family SPIRATELLIDAE

Genus Spiratella Blainville,1817. Type. Spiratella antarctica Forbes. (Limacinidae- Limacina Cuvier,1817).

" Shell subglobose, sinistrally spiral, umbilicated; whorls transversely striated; umbilicus margined." (Tryon S. & S. Conchology- p 94-Limacina)

This is the only family in the order Pteropoda in which the visceral hump and consequently the shell is spirally twisted, and as pointed out by Dr. Baily the systematic position is problematical.

Spiratella pacifica(Dall)1871. " Point Barrow, Arctic Ocean south (Dall) to Redondo Beach, California (Burch.) Type locality,Monterey, Calif.

Collecting data: Off Redondo Beach, Calif. while dredging 5 miles off shore in 75 fms. (Burch); Forrester Island, Alaska- swimming near surface, caught in net (G. Willett); Monterey, Calif., dead on the beach 1866 (Dall) (A. Smith); San Francisco; Catalina Island, 30 fms.; Lat.40-11 N, Long. 125 - 9 W; (Lowe).

In Bulletin 112 Dr. Dall listed Spiratella sp. under subgenus Hetero-fusus Fleming,1823. We have no additional information on this species. It was stated by Dr. Dall " Off Oregon coast, in stomach of salmon".

Family CAVOLINIIDAE

Genus Cavolina Abilgaard,1791. Type (by monotypy), Cavolina natans -- Monoculus telemus Linnaeus.

" Shell external, calcareous, inoperculated, bilaterally symmetrical, not rolled up in a spiral, but at its apex often dorsally recurved. ..The shell has a variable form, which may always be referred to a hollow cone, more or less modified, flattened dorso-ventrally or circular in section. The apex is quite straight, recurved, or truncated; the mouth broad or narrow; with longitudinal or transverse ribs,etc. " (Suter).

Cavolina tricuspida (Rivers),1904. Described as Hyalaea tricuspida from the Pleistocene of Santa Monica Range, Calif. in Bulletin of the Southern California Academy of Sciences, Vol.3, No.5, May, 1904, p.69.

" Shell opaque white; dorsal plate widely convex; smooth on the disc; a lateral spine on either side and a terminal appendage short and truncate behind; parallel to the lateral spines is a carina; on the disc of the other side are five longitudinally situated carinae; aperture sharply truncate on dorsum, but strongly rounded on the opposite plate; the slit reaching quite to the lateral spines" J.J. Rivers.

The consensus of opinion at this time places Cavolina occidentalis Dall, 1908 in the synonymy. Grant and Gale consider it a subspecies of telemus thus making it C. telemus tricuspida (Rivers). The older editions of Keep " West Coast Shells", 1904 Ed. and also 1911 Ed. gave the species the Atlantic name tridentata. Dr. A. Myra Keen advises " Cavolina tridentata Forskal is an Atlantic species, and the name does not apply to our West Coast form as Keep supposed." Mr. Allyn G. Smith comments " C. tricuspida - Prefer to use this rather than telemus until we know more of the relationships between the two and think occidentalis is a synonym. Shells occasionally found on shore at Monterey after winter storms."

Collecting data: Caught in dredge net off Catalina Island (Burch); off San Diego (Dr. Fred Baker);

Cavolina laevigata (" Orbigny" in Deshayes),1836. Lamarck, Hist. nat. Anim. sans Vert., ed.2, vol.7, Jan. 1836, p. 423. Dr. A. Myra Keen states (Per. Comm. Feb. 1945) " This was described as Hyalaea, a synonym of Cavolina. Although Deshayes credits D'Orbigny with the name, there is no evidence he is author of the description, and probably it should be credited to Deshayes direct. We do not have a copy of D'Orbigny's " Voyage dans l'Amerique méridionale", so that I cannot check on the fact of whether he employs a name for the figure. As Sherborn in the Index Animalium credits Deshayes with the publication of the name, it may be the text of D'Orbigny's work was not yet in print or carried no valid names. I believe the California Acasemy has this work and perhaps Dr. Hertlein can check on this point for you. Apparently the species is American,and it may indeed be the thing Willett and Lowe identified." The original description follows:

H. testa subrotunda, depressa, tenui, nitida, hyalina postice uncinata, utroque latere brevi auriculata. D'Orb. Voy. dans l'Amer. me'rid. pl.7, f.15 á 19. Habite... Petite coquille tres remarquable par sa forme singuliére; elle est arrondie, trés déprimée, mince, transparente et polie; son coté supérieur est un peu plus convexe que l'inférieur; les deux cotés sont égaux, et ils sont prolongés posterieurement en une queue étroite, triangulaire, pointue et fortement recourbée en hamecon; l'ouverture est en fente tres étroite, bordée de brun violatre; elle occupe tout le pourtour de la conquille, si ce nest á l'extrémité postérieure,ou les deux parties sont réunies; vu de face, le corps de la coquille ressemble assez bien á un petit peigne; car ses parties laterales sont prolongées en deux petites oreillettes comprimées, formant les commissures de l' ouverture".

Collecting data: Catalina Island, California in 30 fms. (G. Willett).

Genus Clio Linnaeus,1767. Type. Clio pyramidata Linnaeus.

" Shell pyramidal, three-sided, striated transversely; ventral side flat, dorsal keeled; aperture simple, triangular, with the angles produced; apex acute" Tryon S.S. Conch. p 90- as Cleodora Peron & Lesueur,1810.

Clio exacuta Gould,1852. North Pacific Ocean, west of Columbia River (Dall) to Catalina Island, Calif. (G. Willett). Type locality, lat. 44 N.,long. 154 W, that is about 30 degrees west of the mouth of the Columbia River. (fide Oldroyd p. 20)

Collecting data: Catalina Island, Calif. 200 fms. (G. Willett);

Clio occidentalis (Dall),1871. Northeast Pacific between lat. 30 and 50 N. off the Farallon Islands (Dall). Type locality, North Pacific, off coast of California in lat. 33 N., long. 130 W. (fide Oldroyd p.20).

Collecting data: Dead shells dredged in about 100 fms. off La Jolla, Calif. (A. Smith); Santa Maria Bay, Lower Calif. (Lowe). Note: This record of Lowe's is an extension of range southward, to approx. lat. 25.

Genus Styliola Lesueur,1826. Type Styliola subulata Quoy (fide Tryon S.S. Conch. p.91)

" Shell slender, conical, pointed, straight or curved. Fins rather narrow, truncate,with small tentacles projecting from their dorsal edges, and rudiments of the mesopodium on their surface; mantle-margin with a spiral process on the left side. M. Rang states that he has seen these Pteropods clustering round floating seaweed." (Tryon S. and S. Conch. p. 91.

Styliola falcata Gould,1852. Northeast Pacific west of Oregon (Dall) south to Catalina Island, Calif. (G. Willett).

Collecting data: Catalina Island, Calif. in 30 fms. (G. Willett).

Genus Creseis Rang,1828. This genus seems to have been placed in the synonymy of Styliola by Tryon and the majority of authors. Dr. Dall in Bulletin 112 listed the following species:

Creseis subula Quoy and Gaimard,1827. Dr. Dall gave the range as simply " Warmer waters of the north Pacific". The genus is omitted by Oldroyd , Keen and others of recent date. Dr. A. Myra Keen states (Per. Comm. Feb. 1945) " I omitted Creseis subula Quoy and Gaimard because the range was so indefinite. Theile places this species in Styliola and says there is only the one species in warm seas."

Family Cymbuliidae

Genus Corolla Dall,1871. Type. Corolla spectabilis Dall,1871.

" Like Tiedmannia, but with the body pendant below, unattached to the pinnae, ovoid, constricted above; oesophagus produced, oral aperture trumpet shaped, produced into two points. Pinnae forming a single disk with reticulated muscular bands, separated by a deep sinus from the oral portion. Shell entirely absent. " (Dall).

Corolla spectabilis Dall,1871. Lat. 34 (San Pedro) (fide Keen 1937) to Monterey and Lat. 43 N. and Japan Seas (Dall). Type locality, North Pacific

Corolla vitrea (Heath and Spaulding),1901. Described and figured in A.N.S. Phila., 53:509-511, with 1 text fig. A.G. Smith (Per. Comm.Feb.1945) states " According to Heath, a large number of individuals of this species were taken at or near the surface of Monterey Bay in 1900, and since that time great shoals were noted at the same locality on two different occasions. Described as Cymbuliopsis. Not listed by Dall and possibly overlooked by him for Bulletin 112."

We have been unable to get a copy of the original description of this species. When received we will run the description under Additions and Corrections. Not in Oldroyd. See pages 25 and 26 for figure & description.

Suborder GYMNOSOMATA

" In this division the mantle-skirt is aborted,and there is no shell in the adult animal." (Suter).

Family CLIONIDAE

Genus Clione Pallas,1774. Type Clione borealis Brug. (fide Oldroyd).

" Head indistinct; tentacles six, conical, three on each side. Tooth of lingual membrane broad, convex behind, slightly two-lobed and denticulated in front; lateral teeth 12-12, simple, arched, rather swollen at the base, the outer gradually diminishing in size." (Gould, Report on the Invertebrates of Massachusetts).

Clione limacina Phipps,1773. " N. Bering Sea south to the Pribilof Islands, rarely in the Aleutians. Circumboreal." (Dall).

Clione dalli Krause,1885. Archiv. f. Naturgeschichte, vol.51, p. 298, pl.18, fig.19a. Type loc.: Aleutians nordlich vom Akutan Pass.

This species was added from a letter of Dr. A. Myra Keen (Per. Comm. Feb. 1945)" Dall(1908, Smith. Misc. Coll. vol. 50, pt.4, p. 502) considers this to be an immature specimen of C. limacina Phipps. I mention the name here just to put it on record."

Clione elegantissima Dall,1871. South of the Aleutian Islands, in lat. 51 50, long. 131 26 West (Dall).

Family PNEUMODERMATIDAE

Genus Pneumoderma Cuvier in de Roissy in Sonnini,1805. Dr. Dall in Bulletin 112 gave as author of this genus, Peron and Lesueur,1810. Dr. A. Myra Keen (Per. Comm. Feb. 1945) states " According to Sherborn, the first use of Pneumoderma is by Cuvier in 1805, in Sonnini's Suites a Buffon. He had published the name in 1804 in the vernacular, without species. We do not have the 1805 reference, so that I cannot verify whether the genus was without species until the description of P. peronii by Lamarck in 1819." Type. P. peronii Lamarck (?).

Pneumoderma pacifica Dall,1871. San Pedro, Calif. to lat. 45.

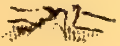
Dr. Dall in Bulletin 112 gave the southern limit of the range as " off the coast of California in lat. 37". However, Dr. A. Myra Keen in " Abridged Check List" gives lat.34, San Pedro, Calif. based on Dall's record in U.S. N.M. vol. 15, p. 194. Type locality. N. Pacific Ocean lat.37 8 N,long.136 10 West.

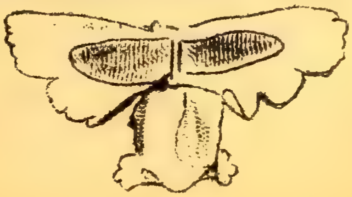
Collecting data: No specific records.

Family DESMOPTERIDAE

Genus Desmopterus Chun,1889. Type (by monotypy), D. papilio Chun. Dr. A. Myra Keen (Per. Comm. Feb. 1945) gives a free translation of the description of the genus given by Thiele " Without shell, body barrel-shaped, its forward part at an angle; foot small, float large, 5 lobed, with 2 long whips; tentacles small, knob-shaped; osphradium right and ventral."

Desmopterus pacificus Essenberg,1919. Off San Diego, Calif. lat. 32 53 N.





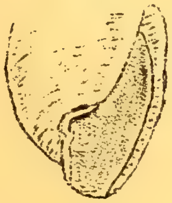
Cavolina tricuspida (Rivers)
Dall's figs.

Order OPISTHOBRANCHIATA
Suborder TECTIBRANCHIATA
Family ACTEONIDAE

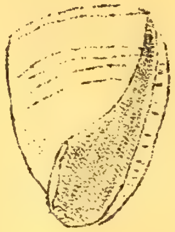
This family included the operculate, opisthobranchiate mollusca which possess a radula, differeing in the last feature from Acteocinidae.

Key to Genera

1. Columella with one fold .... Acteon
2. Columella with no fold .... Rictaxis
3. Columella with two folds .... Microglyphis



Acteon



Rictaxis

Genus Acteon Montfort,1810. Type (by monotypy) Bulla tornatilis L.

" Shell compact, with short spire and large, ovate body whorl; aperture over half the length of the shell, narrowed above, the columella bearing a single, simple, spiral fold." Pilsbry, in Tryaons Manual Conch.

Acteon traski Stearns,1898. Catalina Island to Panama. Type locality, San Diego, Calif.

This species is readily distinguished from the other described Pacific Coast species by generic characters. It is about the size of a large specimen of A. punctocaelata (about 15 mm in length) but has five post-nuclear whorls (including body whorl instead of four."

Collecting data: H.N. Lowe reported the species from Catalina Island in Nautilus, v.18, p. 19. ; dredged in 40 fms. off Ship Rock, Catalina Island (A.M. Strong); Magdalena Bay, Lower Calif. (Willett);

Subgenus Rictaxis Dall, 1871. Type (by monotypy), Tornatella punctocaelata Carpenter.

" Like Acteon s.s. , but with the columella projecting anteriorly or truncate obliquely."

Acteon punctocaelata (Carpenter), 1864. British Columbia to Magdalena Bay, Mexico. to S.E. Alaska (G. Willett). Type locality not given. Oldroyd suggests Santa Cruz, Calif. ? Dr. A. Myra Keen calls attention to the fact that the species was spelled punctocaelata in the original and not as often spelled punctocoelata.

This species is distinguishable from A. traski by the projecting columella , more ventricose body whorl, less effuse anterior lip and smaller size. Specimens that are generally classified as A. punctocaelata from southern California are very much larger than Carpenter's measurements indicate. Specimens in the Oldroyd collection at Stanford are relatively enormous, the largest being about 20 mm. in length.

The largest specimens collected by the Burches came from Monterey Bay in 25 fathoms and measure 15 mm. in length.

Robert E.C. Stearns in Proc. U.S.N.M., vol. 21, p. 299 described a variety as follows: " The Spanish Bight examples of A. punctocaelatus are without the least trace of the broad dark bands that characterize recent or living specimens. They are also much slenderer, and, on the whole, upon a comparison between numerous examples of both, more attenuated and delicate, though the columellar characters are the same. This fossil varietal aspect may for convenience be known as var. coronadoensis " (Reg. Nos. 148265--70, U.S.N.M.). Grant and Gale discuss this variety on p. 443 and place it in the synonymy of the typical along with the variety vancouverensis described by Mrs. Oldroyd. Mr. George Willett reports that he has dredged both the variety vancouverensis and the typical form from southeastern Alaska and the Burches have dredged both forms off Catalina Island and Redondo Beach, Calif. We are disposed to follow Grant and Gale.

Collecting data: Ketchikan and Craig, Alaska (G. Willett); 3-25 fms. in sand, in Monterey Bay, common (A.G. Smith); dredged in shallow water and taken littoral in many localities from Monterey, Calif. to Todos Santos Bay, Lower Calif. (Burch).

Acteon painei Dall,1864. Catalina Island, Calif. to San Diego, Calif.

Type locality, near Avalon, Catalina Island in 50 fms.

The shape of this shell is indicated by the fact that it has been suggested on first sight of specimens that perhaps they are the bulla stage of such a form as Trivia ritteri. However, a careful examination under a glass shows the distinctive sculpture. It is a very rare species and in few collections.

Collecting data: Mr. A.M. Strong has one specimen dredged in 30-40 fathoms off White's Landing, Catalina Island. There is one specimen in the San Diego Museum of Natural History.

There is but one other described species of Acteon from this coast which is A. panamensis Dall,1908 from Panama, and possibly A. venustus(d'Orb from Peru.

Genus Microglyphis Dall,1902. Type. Acteon curtulus Dall.

" This is a group of chiefly deep-water species, characterized by a very short spire and globose shell in which the end of the pillar is not only truncate as in Rictaxis , but has a marked sulcus behind it and is produced laterally into a rather wide spiral flange at maturity, and is concave with a single feeble plait behind the terminal laminae. Inoperculate."(Dall).

Microglyphis breviculus Dall,1902. Monterey, Calif. to Point San Quentin, Lower Calif. (Dall). Type locality, off Santa Rosa Island, United States Fish Commission Station 2902.

Collecting data: Dredged in 75 fms. off Redondo Beach, Calif. (Burch); off Catalina Island, Calif. in 200 fms. (G. Willett); 66-73 fms. off Point Pinos, in green mud and rocks (USFC Sta. 4552) rare (A.G. Smith.)

Microglyphis estuarinus Dall,1908. Straits of Juan de Fuca to Gulf of Calif. Type locality. U.S.S. " Albatross" Station 3194, off Estero Bay, Calif. in 92 fathoms. No collecting records.

Other described species of this genus are: M. mazatlanicus Dall,1908 from Mazatlan, Mexico in 995 fms. and M. parconicus Dall,1889 from the Galapagos Islands in 812 fms.

Family ACTEOCINIDAE

The following letter from Mr. A.M. Strong is an excellent introduction to the problems involved.

" The west coast species in this family can well be divided into three genera and two subgenera on shell characters alone. It may be that a study of the soft parts will make some changes necessary and a comparison with the types of the subgenera here used may also make some changes.

The species in the genus *Acteocina* s.s. are without sculpture, and the spire is elevated, conical, and with the nuclear whorls tilted. As the shell grows the older whorls lap up more and more on the preceeding whorls so that in the adult the apex appears more flattened than is the case with young shells. This is more noticeable in some species than in others. We can recognize three definite species as common in our fauna. *A. eximia* Baird is found in the Puget Sound area. *A. culcitella* Gould is found all along the coast on sandy bottom and in such places as sandy bars at the entrances to bays. *A. inculta* Gould is a very small species that lives on the mud flats in the bays. *A. cerealis* Gould is usually considered to be based on a young specimen of *A. culcitella*, and has been definitely stated to be such by Dall. *A. planata* Carpenter from San Diego is a senile specimen of *A. inculta* in which the spire has become flattened by erosion and the over-lapping of the body whorl. This has been noted by Bartsch. *A. intermedia* Willett, as the name suggests, is similar to both *A. culcitella* and *A. eximia*. If treated as a variety it would be hard to say with which it should be connected. *A. smirna* Dall is found off the coast of Lower California and has been reported as stray specimens from Laguna and San Diego. It does not really belong in our fauna. It is labeled *A. recta* d'Orbigny in the older collections but that species belongs elsewhere. *A. infrequens* C.B. Adams has been reported from Southern California but that is due to misidentifications. The species is not definitely known north of Corinto.

Prior to the dredging of Newport Bay there was a large sand bar just inside the entrance. On this a large number of a small *Acteocina* were collected which Dall identified as *A. magdalensis* Dall. We have seen no specimens from Magdalena Bay or a figure of the type by which comparisons could be made but the description seems to fit this shell. It could well be that this is the shell which Gould named *cerealis* and which Carpenter and others identified as *A. infrequens* C.B. Adams. This shell requires more study.

The subgenus *Coleophysis* contains two species in our fauna, *harpa* Dall from the north and *carinata* Carpenter from the south. The ranges over-lap in Southern California. In these the whorls of the spire are sculptured with fine axial lines which show on the body whorlfor a very short distance below the suture. Dall in Bulletin 112 lists the subgenus under *Retusa* and lists *harpa* under it. *Carinata* is listed under *Acteocina*. The subgenus is quite distinct and more like *Acteocina* than *Retusa*.

The genus *Retusa* s.s. has the whorls lapping over each other until the apex is slightly or not at all raised above the shoulder of the body whorl. Three circumboreal species are listed from the Arctic Ocean but probably do not belong to our fauna.

The subgenus *Sulcularia* has the overlapping of the whorls carried to a still greater extreme until the spire is in a deep sunken pit in the apex and more or less obscured by the body whorl. Only one species is reported in our fauna, *S. xystrum* Dall, though there are several species from further south. All are sculptured with axial lines. It is probable that these should be treated as a good genus.

The genus *Volvulella* has an extension of the posterior end of the outer

lip which entirely covers the spire and ends in a more or less distinct apical point. Four species are listed from Southern California and several from further south. The Southern California species are V. cylindrica Carpenter, V. cooperi Dall, V. californica Dall, and V. tenuissima Willett. They can be separated by the arrangement of the incised spiral sculpture and slight differences in size and shape."

A report on this family was prepared by Tom Burch for the meeting of the Conchological Club of September,1938. This paper was published by the club at that time and covered a discussion of the anatomy, radulae etc. as well as data on the species. Information from this paper will be freely used here without further reference.

A few of the publications referred to follow: Arnold, Ralph, Paleontology and Stratigraphy of the Marine Pliocene and Pleistocene of San Pedro, Stanford University, 1903; Carpenter, Catalogue of the Reigen Collections of Mazatlan Mollusca, 1855-57, British Museum; Dall, W.H., Proceedings of the U.S. National Museum, 24:499-566, 56:293-371; Dall, W.H., Nautilus, vol.35, p.96,1922 and vol. 39, p.25,1925;Dall, W.H., Bulletin U.S. Natl. Mus. No. 112,1921; Dall, W.H., Amer. Jour. Conch. 7:136; Grantand Gale, Pliocene and Pleistocene Mollusca of California, San Diego Society of Natural Hist. 1931; Keen. A. Myra, West North American Marine Mollusca, Stanford Univ., 1937; Keep and Baily, West Coast Shells, Stanford Univ., 1935; Oldroyd, Ida, Marine Shells of Puget Sound, Univ. of Wash., 1924; Oldroyd, Ida, Marine Shells of the West Coast of North America, Stanford University,1927; Oldroyd, T.S., Nautilus, vol.34,p.114,1921; Pilsbry, H.A. and Tryon, G.W. Manual of Conchology, vol.15; Sowerby, G.B. Jr.,1889; Strong, A.M., Nautilus vol.35, p.44,1921 and vol.35 p. 122,1922; Willett, G.W., Nautilus, vol.42, p.37, 1928; Willett, G., Trans. San Diego Soc. Nat. Hist., vol.8,1937; Willett, G., Bulletin Southern Calif. Acad. of Sciences, vol.43,pp.71-73, 1944; Woodring, Carnegie Inst. Publication # 385, 1928.

Genus Acteocina Gray,1847. Type (by original designation), Acteon wetherilli Lea, Miocene of New Jersey. fide Grant and Gale, 1931, p.446.

" Shell small or medium sized, cylindrical, spire low, suture chanelled nuclear whorls small,papillate, more or less submerged, coiled at an angle of about 90 degrees to axis of post-nuclear whorls; aperture long,narrow, dilated,and rounded at anterior end; columella bearing an oblique basal fold emerging from aperture and merging into basal lip; sculpture absent or consisting of faint spiral grooves." (Woodring, Carnegie Inst. Publ. No. 385, p. 119, 1928).

Grant and Gale, 1931 advanced the theory that the differences between Acteocina and Retusa are so small and variable as to not be of generic significance, and therefore used the genus Retusa with Acteocina as subgenus. However, this has not been generally accepted.

Acteocina culcitella (Gould), 1852. Kodiak Island, Alaska south to San Martin Island, Mexico(Strong) , reported from San Ignacio Lagoon by E.K. Jordan. Type locality, Santa Barbara, Calif. (fide Oldroyd, p. 28).

The consensus of opinion at this time places the species cerealis (Gould) in the synonymy as being based on a young specimen of this species.

This species is distinguished from the other species of the genus by its long pointed spire and heavy fold on the columella.

Collecting data: A comment from Mr. George Willett who has collected extensively in Alaska is of particular interest " I would question Alaskan records". Dredged off Monterey in 20 fms. shale bottom, Redondo Beach, Calif. in 25 fms., off Avalon, Catalina Island in 25 fms., off Santa Monica, Calif.

Todos Santos Bay off Punta Banda (Burch); Monterey Bay in 10-25 fms. (A. Smith); Drier Bay, Knight Island, Alaska ,1923, in 15 fms. mud (Eyerdam).

Acteocina eximia (Baird),1863. Kodiak Island, Alaska south to Monterey, Calif. (Dr. Bolin) (Keen). Type locality, Eqquimalt Harbor, Vancouver Island.

This species has often been used as a subspecies of culcitella and it may be. However, it is distinguished by the lack of the heavy fold on the columella and in its shorter spire, which is set in a circular depression just within the upper margin.

Collecting data: Forrester Island and Craig, Alaska (G. Willett); Izhut Bay, Afognak Island, Alaska in 10 fms. mud, 1922 (Eyerdam); Hinchinbrook Island, Pr. Wm. Sound, dredged (I. Norberg,1932); 20-158 fms. in Monterey Bay, in mudand fine sand, fairly common (A.Smith).

Acteocina intermedia Willett,1928. Nautilus vol.42, pp. 37-38 .

This was described as a subspecies of culcitella. Inasmuch as this is not in Oldroyd the original description follows:

" Acteocina culcitella intermedia, new sub species. Description: Shell cylindrical,with short spire, the latter, however, not excavated at the apex. Columellar fold wanting or only slightly indicated. Lip and aperture as in A. c. eximia. Type number 1015 collection of Los Angeles County Museum, dredged by G. Willett in 30 fathoms at Catalina Island, California, August 11,1928. Measurements of type in millimeters: Alt. 14, Diam. 5.7, Alt. of spire 1.65. Paratypes in collections of A.M. Strong and the writer.

Intermedia is easily separated from typical culcitella by much shorter spire and absence of heavy columellar fold; it differs from eximia in more pointed and unexcavated spire. All of the specimens of intermedia seen by the writer have been dredged in from twenty to forty fathoms off the southern California coast. A few specimens of apparent intergrades between i intermedia and eximia were dredged in twenty-five fathoms near Craig,Pr. of Wales Island, Alaska, while at Forrester Island,fifty miles to the southeast, only eximia was found."

Collecting data: The exact range of intermedia is therefore uncertain but our experience has been to dredge it from Monterey to Todos Santos Bay, Lower Calif. It was the predominant species of the genus in dredgings off Redondo Beach, Calif. (Burch); San Pedro, Calif. in 10-20 fms. and off Catalina Island in 30 fms. (G. Willett); 10-30 fms. in Monterey Bay, in mud common (A. Smith).

Acteocina smirna Dall,1919. San Diego, Calif. to San Salvador
Type locality, San Diego, Calif.

This species has been reported from Laguna Beach, Newport Bay, San Pedro etc. However, all of these records so far examined north of San Diego have proven to be based on errors in identification. The species smirna is described as having among other characters the dimentions of -length 4, diameter 2. Obviously an occasional pathologic specimen of other species might attain these proportions. We have numerous sets in our collection that have been labelled smirna for the above reasons, but the only set on which we have this label today is a large series from San Martin Island from the collection of the late Dr. Fred Baker. In any event if the Baker shells are true smirna these others are not.

Collecting data: San Martin Island (Dr. Fred Baker); Point Loma, San Diego (Miss Edna N. Wilson)

Acteocina inculta(Gould),1856. Monterey, Calif. to Gulf of California. Type locality, San Diego, Calif. (fide Oldroyd, p.28)

This species differs from A. carinata (Carpenter) in not being as wide and flat on top and in being " pinched in" at the top of the body whorl. Mr. George Willett thinks that A. carinata may merely be a southern form of A. inculta.

Collecting data: Occasionally found on mud flats of southern California bays in considerable numbers. The shellsaverage about 4 mm. in length. They are found travelling just under the surface of the mud, and their presence is shown by a trail very similar to that of a small Olivella. Acteocina culcitella is occasionally found along with A. inculta. We have taken them this way at Mugu and Anaheim Bays. We have also dredged them in shallow water from Monterey to Todos Santos Bay. Found abundant in Morro Bay by Mrs. Rose Burch in May,1940 and in Alamitos Bay in Oct.,1940. The deepest record we have for the species is a bathymetric range off Redondo Beach from littoral to 25 fathoms. (Burch);

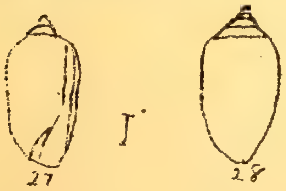
A note from A.G. Smith in regard to this species follows: " The Monterey record in Bull. 112 was based on a worn specimen of Retusa harpa , according to Gordon, and we have not collected it in the Bay. If your specimens are really inculta, we would like to add this to our list of valid species. " In reply to this comment will state that we have a few specimens that we identified as inculta although the predominant form in our dredgings off Monterey was A. intermedia Willett with Coleophysis harpa Dall not uncommon. (Burch).

Acteocina magdalenensis Dall,1919. Proc. U.S. Natl. Mus. 56:296. Newport Bay, Calif. to Magdalena Bay, Lower Calif. Type locality, Magdalena Bay.

This species was well figured by Mrs. Oldroyd vol.II, part 1, Pl.2, figs 2a,b. There has been a great deal of discussion regarding this species. The theory was advanced by Grant and Gale that it may be but the young of culcitella. However, it is our opinion that it is a good species and is distinguished by the oliva-like spire, more or less elevated and deeply channelled along the suture. It is smaller than adult culcitella and is a creamy color. We have compared it with numbers of young culcitella of the same size and found them easily separable.

Collecting data: The only specimens we have seen were from the entrance to Newport Bay collected by Mr. A.M. Strong and a set from Laguna Beach collected by Dr. W.O. Gregg. Mr. George Willett comments " Have this name on several lots of southern California specimens."

Dr. A. Myra Keen of Stanford University sent us a tracing of the original figures of Acteocina inculta (Gould) which are retraced below:-



Acteocina oldroydi Dall,1925. Departure Bay,British Columbia.

This species is known from the type locality only and none of our members have reported having a specimen.

Acteocina planata (Carpenter),1865. The consensus of opinion is that this species should be placed in the synonymy of A. inculta (Gould) on the theory that it is based entirely on senile specimens of inculta. It is described as having a flat top and being more slender than inculta. It was described from San Diego and presumably only found att the type locality. We have specimens from the lare Dr. Fred Baker taken from San Diego, but find that we can select the same form from our series of inculta from Redondo Beach and elsewhere. We are, therefore, abandoning the name planata.

Acteocina infrequens (C.B. Adams), 1852. Cape San Lucas to Panama. Type locality, Panama.

We list this species here because it was listed by Dr. Dall in Bulletin 112 with a range from Santa Monica south. There has been a great deal of misunderstanding of this species and unfortunately also a great many misidentifications. The species has never been figured to our knowledge.

Mr. A.M. Strong states that it is definitely not of the California fauna and is far more slender than any of our species. It is to be expected that Dr. Hertleinand Mr. A.M. Strong will give us a clearer idea of what this species is when their work on the southern fauna is published on this group.

We have record of but one other species of Acteocina from this coast and that is from the southern fauna. It is Acteocina angustior Baker and Hanna,1927 ranging from the Gulf of California to Acapulco, Mexico. It was described in Proc. Calif. Acad. Sci. Ser.4, vol.16, p. 124, pl.4mfig.5.

Genus Coleophysis Fischer,1883. Type (by monotypy), Utriculus truncul-us (Bruguiere). The original description from Manuel Conchyl., p.555: " Sommet tronqué , concave; coquille légèrement dilatée eh avant, rétrécie en arrière; pli columellaire plus ou moins distinct. Ex.: Utriculus truncul-us (Bruguiere), des mers d' Europe".

Coleophysis was used as a section of the genus Retusa by Dr. Dall, under which he placed the species harpa Dall, 1871. Dr. Dall placed the species carinata (Carpenter),1857 under Acteocina s.s. Inasmuch as both of these species in our fauna have the fine axial sculpture of Coleophysis, but not the spire of Retusa s.s., it seems logical to us to raise Coleophysis to generic standing.

Grant and Gale, 1931, pp.445-446 discuss Coleophysis as follows: " Retusa harpa (Dall) has the fine axial sculpture of Coleophysis Fischer but the type of the latter has an involute spire, the outer lip extending the entire length of the shell." Dr. A. Myra Keen (Per. Comm. March,1945) comments " The type of Coleophysis has a truncate if not a sunken spire."

Coleophysis carinata (Carpenter),1857. Redondo Beach, Calif. (Burch) to Panama (Zetek). Type locality,Mazatlan, Mexico.

This is a short blunt spired species, smaller than young Acteocina culcitella and is wider and flatter and more carinated on top than A. inculta. The suture is not channeled.

Collecting data: Dredged off Redondo Beach in 15-to 25 fms.

Coleophysis harpa (Dall),1871."Queen Charlotte Islands to San Diego" (Dall) but the present known range is Forrester Island, Alaska (G. Willett) to San Martin Island, Mexico (Dr. Fred Baker). Type locality,Monterey, Calif.

This species is easily distinguishable by the heavy longitudinal sculpture on the upper half of the body whorl.

Collecting data: It is interesting to note that specimens from the northern end of the range seem to average much larger and coarser. We have found it a not uncommon dredged species with a bathymetric range of from 15 fms. or less to as deep as 75 fms. off Redondo Beach. We dredged it off Monterey, Calif. in 15 to 25 fms., off Avalon, Catalina Island in 25 fms., to Todos Santos Bay, Lower Calif. (Burch); Forrester Island, Alaska to Los Coronados (G. Willett); 10-40 fms. in Monterey Bay, in fine sand and mud, common (A.G. Smith); Drier Bay, Knight Island, Alaska,1923 in mud at roots of eel grass (W.J. Eyerdam)- and the note Extended Range- to Prince William Sound, Alaska (W.J. Eyerdam); dredged off Friday Harbor, Puget Sound, Wash. (Trevor Kincaid).

Genus"Sulcularia" Dall,1921. U.S. Nat. Mus. Bulletin 112, pp. 61, 202, Feb.24,1921. Type (by original designation) (p.202) Retusa sulcata (d'Orbigny) as Bulla.

Dr. Dall proposed the name Sulcularia in Bull. 112 as a section of the genus Retusa. However, it is the consensus of opinion that the species involved are sufficiently distinct from Retusa s.s. or any other described genus to be placed in a separate genus.

Dr. Woodring raised the subgenus to generic rank and we agree with his solution other than the possible question of the name Sulcularia Dall. The difficulty here is well stated by Dr. Myra Keen (Per. Comm. March,1945) as follows: " Sulcularia Dall,1921 - Bull. 112, pp 61,202- is, as your cards reveal, a homonym of Sulcularia Rafinesque,1831, and is not available for use. Until soneone gets around to proposing a substitute name or finding an available synonym, we had best use this name in heavy quotes, disinfecting it as much as possible." If there is any valid reason for ignoring Sulcularia Rafinesque,1831, it will no doubt be called to our attention. In the meantime it seems somewhat futile to clutter up our records with a name that is apparently already consigned to the synonymy. Therefore we propose to use the name Sulcoretusa to replace Sulcularia Dall. (Burch)

Grant and Gale,1931, p. 446 discuss this genus as follows: " Retusa xystrum (Dall), which ranges from San Pedro to San Diego, belongs to the section Sulcularia Dall. This section is very close to Coleophysis Fischer, but it has an apical perforation and no plication on the columella. The types of both Coleophysis and Sulcularia have fine axial sculpture, but the former has a very small fold or plication which is entirely absent on Sulcularia. Retusa xystrum (Dall), has fine axial striae. It is a very delicate, small shell, about 2 or 3 mm. in length."

Sulcoretusa xystrum (Dall),1919. San Pedro, Calif. to San Diego. Type locality, San Diego.

Shell subcylindric with a deep pit at the apex; sculptured with extremely fine longitudinal grooves covering the whole surface.

Collecting data: San Pedro, Calif. in 10 fms., 1 specimen (Burch)

The following note from Mr. A.G. Smith is of interest in connection with the above species. " Retusa (new species) - Described and figured in our Monterey paper. Like xystrum, but has finer sculpture. It is a rare species."

There are several other species in this group in the southern fauna and the key to species from the notebook of Mr. A.M. Strong should be of great value to students working on this material. The key follows.

Sulcoretusa (Sulcularia Dall)

Spire involved, apex with a deep pit
. Shell widely constricted around the middle
.. Sculpture of fine axial grooves only
3 x 1 mm. Gulf of Calif. to Panama .... luticola C.B. Adams
.. Sculpture of fine axial and spiral striations
2.5 x 1 mm Gulf of California................. carpenteri Hanley
. Shell very little constricted around the middle
.. Sculpture of fine axial grooves only
... Outer lip evenly rounding into the base
3 x 1 mm. San Pedro to San Diego .... xystrum Dall
... Aperture very narrow behind the base
3 x 1.5 mm Galapagos .... galapagana Dall

Genus Retusa Brown,1827. Type, Bulla obtusa Montagu (-- ? plicata Brown -- ? discors Brown ,-- Voluta alba Kanmacher, fide Iredale,1915, and Woodring,1928); figured by Montagu, Test. Brit., pl.7, fig.3, 1803. fide Grant and Gale, 1931, p. 445.

" Columella without plications; inner lip incrusted with callus, which may be sharply deliminated; umbilicus closed or a mere chink."

Retusa semen Reeve,1856. Off Point Collinson, Arctic Ocean (Dall) to Prince William Sound, Alaska (Eyerdam). Type locality. Port Refufe,Nova Zembla.

Collecting data: Drier Bay, Knight Island, Alaska, 1923 in 10 fms. mud (W.J. Eyerdam).

Dr. Dall reports this species also from the Atlantic but it is not listed in Johnson or other faunal lists of Atlantic species in general use.

Retusa obtusa(Montagu)1803. Arctic Ocean to St. Mathew Island.Circumboreal. (Dall). Listed from Greenland by Johnson " Mollusca of Atlantic Coast"and a variety R. obtusa turrita Moller,1842 is also listed from Greenland. Type locality. England (fide Oldroyd p.32).

Collecting data: Inasmuch as this is the accepted type of the genus this species is of particular interest. Grant and Gale, 1931, p. 445 say of it " Bulla" obtusa, the type of Retusa, is a small, somewhat cylindrical shell without a columellar plication and with a spire which varied considereably in height and may even be truncated, the apex sometimes turned inwards. Jeffrey's description of the species is excellent."

Retusa pertenuis (Mighels),1843. Arctic Ocean; Bering Sea (Krause). Also Atlantic. (Dall). Johnson gives the Atlantic range as follows: " Greenland to Fernandina,Fla.,10-294 fms.". Type locality. Casco, Maine. (fide Oldroyd) Mrs. Oldroyd also states that the type is lost.

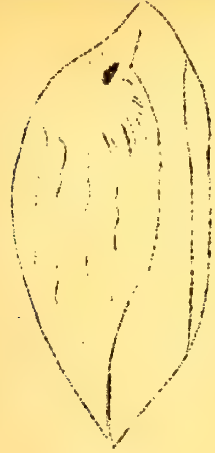
Collecting data: Reported from Tromsofjord, Norway, collected in 1936 by I. Norberg (W.J. Eyerdam).

Genus Volvulella Newton,1891. Type (by subsequent designation, Bucquoy,Dautzenberg,and Dollfus,1886), Volvula rostrata A. Adams ; Australia. (fide Grant and Gale, p. 450).

" This genus is characterized in general by the thin, spindle-shaped shell, the concealed spire, and the posterior spine. The anterior end of the aperture is dilated, the columella bearing a faint fold." Grant and Gale.

The following note from Dr. A. Myra Keen is of interest about this genus (Per. Comm. March, 1945) " I notice that some Australasian writers

are adopting Rhizorus Montfort,1810 instead of Volvulella Newton, but I do not think this is advisable. Below I give a tracing of R. adelaidis Montfort, the monotype. The species is said to come from the Adriatic, but Bucquoy, Dautzenberg, and Dollfus could not recognize it. The description mentions green coloring with reddish zigzag lines and describes an umbilicus. It is undoubtedly a microscopic opisthobranch of some sort but not the thing we know as Volvulella."



Volvulella cylindrica (Carpenter),1863. Vancouver Island to Gulf of Calif. Type locality, Santa Barbara, Calif.

The entire surface of this species is covered with distant spiral striations. It is less cylindrical than V. cooperi and further differs in the more produced posterior spine.

Collecting data: Dredged off Monterey, Calif. in 40 fms., off Redondo Beach in 25 fms., off Avalon, Catalina Island in 25 fms., off Santa Monica in 15 fms., off Ensenada, Mexico in 20 fms. (Burch); San Pedro, Catalina Island, S. Coronado Island in 15 -30 fms. (G. Willett); off Monterey, Calif. in 15-63 fms., in sand and mud, scarse in the bay (A.G. Smith).

Volvulella cooperi Dall,1919. Point Sur, California to Scammon Lagoon, Lower Calif. (Dall,1921). Type locality, Scammons Lagoon, Lower Calif.

This species is without sculpture and is less distinctly spinose in the adult than any other West Coast species.

Collecting data: For a number of years the Burches identified specimens of the species V. tenuissima Willett with the label cooperi. This was done on the assumption that the type of V. cooperi was worn and did not show the fine spiral striae. This was in error and the many correspondents who received specimens from the Burches labelled V. cooperi are requested to change the label to read V. tenuissima Willett,1944. We have never dredged a single specimen of typical V. cooperi. (Burch).

Volvulella californica Dall,1919. Santa Cruz, Calif. (A.G. Smith) to San Diego, Calif. (Dall). Type locality, off Santa Rosa Island, Calif.

This is the least cylindrical of the genus in our fauna tending to be slightly ovate. The spiral sculpture is confined to the anterior end.

Collecting data: Just noted that the dredging of this species in 50 fms. in Todos Santos Bay, Lower Calif. is an extension of the range southward from San Diego. Also dredged off Santa Monica, Calif. in 50 fms. and off Redondo Beach, Calif. in 75 fms. (Burch); San Pedro, Calif. in 30 fms. (G. Willett); 45 fms. off Santa Cruz, in soft green mud (USFC Sta. 4483); 298 fms. off Point Sur, in mud and yellow sand (USFC Sta. 3187) (A.G. Smith)

Volvulella tenuissima Willett,1944. Bulletin, So. Calif. Academy of Sciences vol.43, pt.2,1944,pp 71,72,73, pl.14, fig.1. Range Redondo Beach, Calif. the type locality to Todos Santos Bay, Lower Calif., Mexico.

The original description of this species follows:

#47 p 19 April,1945

" Shell imperforate, cylindrical,very slender; aperture narrow, as long as the shell; rounded in front; spine short. Color grayish white, with brown stain from spine down inner side of aperture to and including the columella. Axial sculpture of growth lines curved toward the extremities; spiral sculpture of exceedingly fine,wavy striations that cover the entire surface of the shell, but are visible only with the aid of a fairly strong glass.

This shell is nearest to V. cylindrica Carpenter, but is smaller, much more slender, and lacks the distant spiral striae characteristic of that species."

" The type, No. 1073 Los Angeles County Museum, and numerous additional specimens were collected by John Q. and Tom Burch off Redondo Beach, Calif. in 75 fms. Paratypes are in the U.S. National Museum, California Academy of Sciences, and in the Burch and Willett collections.

The type (not quite adult) measures: Long. 4.3, lat. 1.6 mm. The largest specimen at hand measures 6 x 2.1 mm."

Our fauna contains but the four species but the following keys from the notebook of Mr. A.M. Strong should be of great value to any student working on the group. Mr. Strong covers the southern fauna as well.

Genus Volvulella

Shell more than 7½ mm. in length
    9.5 x 3.6 mm Pt. Sur to Gulf of Calif. ... cooperi Dall
Shell less than 5 mm. in length
. Shell smooth or with microscopic growth lines only
.. Length 3½ times the diameter
    3.5 x 1.0 mm. Galapagos Islands .... callicera Dall
.. Length 2½ times the diameter
    4.25 x 1.75 mm. West Mexico to Panama .... panamica Dall
. Shell with microscopic spiral striations
.. Spiral striations confined to the anterior end
... Length 2½ times the diameter
    4.0 x 1.7 mm. Santa Cruz, to Todos Santos Bay californica Dall
... Length 1½ times the diameter
    2.75 x 1.8 mm. Panama Bay .... catheria Dall
.. Spiral striations not confined to the anterior end
... Length 3 times the diameter
    4.2 x 1.5 mm. West Mexico to Panama .... lowei Strong and Hert.
... Length 2½ times the diameter
    4.25 x 1.75 mm. Vancouver to Gulf of Calif..... cylindrica Carpenter.
... Length 3 times the diameter
    4.3 x 1.6 mm. Redondo to Todos Santos Bay ..... tenuissima Willett.

Spire involved, apex covered, with a more or less distinct spine
. Surface smooth or with microscopic lines of growth
.. Apical spine separated from the outer lip by a sulcus
    4.25 x 1.75 mm. Panama .... panamica Dall
.. Outer lip rounding into the apical spine
... Young with a short spine, in the adult obsolete
    9.5 x 1.75 mm Pt. Sur to Scammons Lagoon ..... cooperi Dall
... Spine short, outer lip falling a little short of the end. 3.5 x 1 mm Galapagos .... callicera Dall

. Anterior end with a few microscopic spiral striations
.. Apical spine short, not extending beyond the outer lip
4 x 1.7 mm. Santa Cruz to Todos Santos Bay .. californica Dall
.. Apical spine hardly perceptible
2.75 x 1.8 mm. Panama Bay .... catharia Dall
. Both anterior and posterior end with spiral striations
4.2 x 1.5 mm. Gulf of Calif. to Panama ..... lowei Strong & Hertlein
. Entire surface with distant spiral striations
4.25 x 1.75 mm. Vancouver to Gulf of Calif. cylindrica Carpenter
. Entire surface covered with fine wavy striations
4.3 x 1.6 Redondo to Todos Santos Bay ..... tenuissima Willett

The southern species covered by the above key are V, panamica Dall, 1919 - V. catharia Dall,1919- V. callicera Dall,1919- V. lowei Strong and Hertlein,1937.

Family SCAPHANDRIDAE

Genus Scaphander Montfort,1810 Type (by original designation),Bulla lignaria Linnaeus.

" Shell external, ovate, imperforate, reaching a large size; spire involute, apical perforation shallow, closed by a callus; aperture large, wide, anterior part broadly expanded; inner lip closely appressed; parietal wall covered with callus; sculpture consisting of narrow spiral grooves." (Woodring, Carnegie Inst. Publ. No.385, p.126,1928).

Scaphander willetti Dall,1919. Forrester Island, Alaska.

Genus Bulla Linnaeus,1758. Type (Absolute tautonymy): Bulla naucum Linnaeus. (Syn: Atys Montfort,1810.)

A shift of a familiar name from the group to which it has been applied for many years to replace another well known name is a matter that should be studied closely by all members. We are reluctantly accepting the change in the face of unquestionable evidence. This matter was first brought to our attention by Dr. Joshua L. Baily Jr. (Per. Comm. Feb.,1945) " When you come to discuss the genus which was formerly called " Bulla", you might point out that this name is not available owing to an earlier type designation of Bulla naucum by Linnaeus, who referred to this species as " the Bulla". This action, according to Bartschand Rehder who have supplied the data makes the name Bulla apply to the group formerly called Atys. Furthermore, the two names Bulla and naucum, have the same meaning, so that the species becomes type by tautonomy. As Bullaria was proposed as a substitute for Bulla, it must take the same type,and is also not available. The earliest available name appears to be Vesica Swainson,1840. Rehder in supplying this data refers to Article 30d and Opinions 6 and 55 of the International Code .

This result shows well the ridiculous conclusions to which one must come if one attempts to follow the rules of the International Commission. Bartsch thinks that the genus Bulla-- Vesica is not sufficiently large or important to justify an appeal to the commission to exercise its plenary powers of suspending the rules until Bulla can be placed on the official list with B. ampulla designated as type. Personally I feel that it is of sufficient importance. I believe Bartsch's and Rehder's interpretation of the name and the rules is correct,and unless such an appeal is taken we will have to make this undesirable shift of terms."

Dr. A. Myra Keen discusses the matter as follows (Per. Comm. March 1945) " I should like very much to find a loophole in the Bartsch and Rehder argument re Bulla but regret that I cannot. Below is a complete transcript of the evidence:

Linnaeus,1758, proposed the genus Bulla with some 23 species, no.6 of which is --

" Naucum.332.B. testa rotundata pellucida transversim substriata utrinque umbilicata.

Rumph. mus. t. 27. f.H. Bulla
List conch. 4. f. 9. c. 10. t. 1. f. ult.
Gualt. test. t. 13. f. GG.
Argenv. conch. t.20. f.Q.
Habitat in Asia"

It is the use of the word " Bulla" following the citation of figures in Rumphius that will change our concept of the genus. Throughout the " Systema Naturae" Linnaeus occasionally quotes the names, sometimes uninomials, sometimes binomials, sometimes polynomials, used by these pre-Linnaean authors. I have checked as many as we have original literature on to make sure that he is consistent and he seems to be. Although I do not have Rumphius at hand, it is safe to assume from other examples that Rumphius used " Bulla" in the sense of a specific name. Now the International Rules, Art. 30d, as pointed out by Drs. Bartsch and Rehder state: " If a genus, without originally designated or indicated type, contains among its original species one possessing the generic name as its specific name or subspecific name, either as valid name or synonym, that species or subspecies becomes ipso facto type of the genus.(Type by absolute tautomymy)."

Opinion 16, which is a further clarification of this Rule, states: " In deciding whether a case of absolute tautonymy is present, the citation of a clear prebinomial specific name in synonymy is to be construed as complying with the demands of Art. 30d. Examples: Equus caballus (Equus cited in synonymy in the sense of ' the horse').." (Which is precisely equivalent to the citation of Bulla of Rumphius.)

Glancing through the " Systema Naturae" under molluscan genera, I find only three genera in which the rule of absolute tautonymy may be invoked (though, of course I may have missed some). Bulla we have just discussed; Ostrea would take the type O. edulis - fortunately the same as designated later by Children; and Pinna, for which Grant and Gale have already invoked this principle. It is ironic that they overlooked the Bulla. And I, too, overlooked it.

I am inclined to agree with Drs. Bartsch and Rehder on the undesirability of petitioning for a suspension of rules, though on different grounds. It seems to me the fewer exceptions we ask for, the sooner stability will be achieved. This change is unpleasant, yes, but once made it should be permanent. Our species of Atys will now be Bulla; our species of " Bulla" will be Vesica.

The data for Vesica Swainson,1840 are: Treatise on Malacology, p. 360. Type (by subsequent designation, Gray,1847), Bulla ampulla (Linne)"

The following description of the genus Bulla is obviously the description of the genus we have known as Atys. " 'Bulla' has a fold on the columella and the aperture projects over the vertex of the shell as a fold, in a manner somewhat similar to the manner in which the columella fold projects above the vertex of the body whorl. There are usually spiral striations on the shell and typically a small umbilicus is present. "

For discussion of the species of Bulla see page 29.

Genus Diaphana Brown,1827. Type. Diaphana minuta Brown.

This genus differs from Acteocina and Retusa in possessing a radula, in the absence of stomach plates etc. The shell is more globose and fragile than in Acteocina and Cylichna, with a large umbilicus, thin columella and without distinct sculpture. The lack of epipodial lobes and of uncini (radula teeth) also distinguish this genus.

Diaphana brunnea Dall,1919. Kodiak Island, Alaska.
This species is figured in Oldroyd, vol.2, pl.2, fig.15.

Diaphana californica Dall,1919. Monterey , Calif. (Smith) to South Coronado Island,Mexico (Willett). Type locality, Long Beach, Calif.

This species is figured in Oldroyd, vol.2, pl.2, fig.12.

Collecting data: 10-25 fms. in sand and also in a kelp holdfast, Monterey Bay. This is an extension of range. I also have 2 specimens collected at Reef Pt., Orange Co. (A.G. Smith); South Coronado Island Mexico at low tide in sand under rocks (G. Willett); Malaga Cove, Redondo Beach, Catalina Island (G. Willett); Redondo Beach in 25 fms. (Burch).

Mr. George Willett has collected this species at Ketchikan, Alaska which is a great extension of range. Correct the above stated range to read Ketchikan, Alaska (Willett) to South Coronado Island (Willett).

Diaphana globosa Loven,1846. Bering Strait and Arctic Ocean. Circumboreal. (Dall).(Krause). Type locality. Scandanavia.

Genus Brocktonia Iredale,1915. Proc. Malac. Soc. v.11, p. 340.

" I propose this name for Cryptaxis crebripunctatus Jeffreys, Proc. Zool. Soc. 1883, p. 398, pl.44, figs.11 a-c: between Hebrides and Faeroes. This shell does not really fall into Cryptaxis Jeffreys,1883, which is moreover invalid, and for which Cossmann (Essais Paleoconch. comp. vol.1, p. 90, 1895) has provided the substitute Clistaxis." (Iredale).

" This shell resembles Cylichna, but has the spire almost concealed." (Dall).

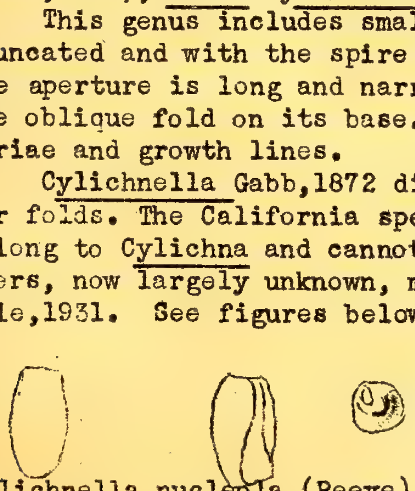
Brocktonia polystrigma(Dall)1908. Newport Bay, Calif. (Strong) to San Diego. Type locality, off entrance to San Diego Harbor in 50 fms.

Collecting data: Off Newport Bay in 20 fms. (A.M. Strong).

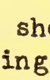
Genus Cylichna Loven,1846. Type (by subsequent designation, Hermannsen,1852), Bulla cylindracea Pennant.

This genus includes small, cylindrical shells with the posterior end truncated and with the spire involute, leaving a small apical concavity. The aperture is long and narrow, dilated below and the columella bears one oblique fold on its base. Sculpture is absent or confined to fine spiral striae and growth lines.

Cylichnella Gabb,1872 differs from Cylichna in possessing two columellar folds. The California species, according to shell characters, should belong to Cylichna and cannot be placed in Cylichnella. Anatomical characters, now largely unknown, may require a revision of the group. Grant and Gale,1931. See figures below. Tracings of original figures.



Cylichnella nucleola (Reeve)



Cylichnella occulta Mighels

Cylichnella bidentata d'Orbigny

Cylichna attonsa Carpenter

Cylichna alba (Brown), 1827. Both the rangeand the name alba have been seriously questioned in our fauna. Dr. Dall gave the range in Bulletin 112 " Circumboreal, Arctic Ocean to Monterey". It has been reported as far south as San Diego. Johnson gives the range on the Atlantic as " Greenland to Block Island, R.I. and North Carolina. Circumboreal, 10-1091 fath." andalso lists a subspecies C. alba corticata Beck from Greenland. Type locality is Greenock, Great Britain (fide Grant and Gale,p.453).

In the first place perhaps we should consider the question of whether or not our Pacific coast species is conspecific with the Atlantic C. alba. Dr. A. Myra Keen (Per. Comm. March,1945) " I believe our species called Cylichna alba Brown is misidentified and that it is distinct from the Atlantic species. Ours is more cylindrical, wider near spire, longer, with thicker lip and a stronger spiral ridge at the apex." A further note from Dr. Keen " C. alba (Brown) is a species dubium as far as our collection is concerned. The specimen figured in Oldroyd (vol.2, pt.1, pl.?) is obviously misidentified. I believe it is C. nucleola (Reeve); the specimen is from Icy Cape, Alaska. " But on the other side we have the following note from Mr. George Willett of the Los Angeles Museum " Myra Keen may be right that there are slight differences between Atlantic and Pacific specimens of Cylichna alba, but a few years a go I compared the two (using Atlantic specimens from the Chace collection), and it seemed to me that they were enough alike to be conspecific. As you know, most of my living specimens are not " glossy a nd white", a s the description calls for, but some of the young ones might be so described."

This species is less elongate and less cylindrical than C. attonsa, and it does not have the anterior portion of the lip produced as does C. diegensis. Apex bearing a fold and is not perforated as in C. diegensis.

The consensus of opinion seems to be that the species we now know as C. alba from this coast should be redescribed and renamed either as a new species or a subspecies at least.

Collecting data: Craig and Ketchikan, Alaska in 15-30 fms. (G. Willett) " Mackenzie Gordon and I are inclined to doubt whether alba is a species of the Monterey fauna, believing that it is northern. We have used the following name for the common Monterey species- C. attonsa " (A.G. Smith); Drier Bay Knight Island, Pr. Wm. Snd., Alaska,1923 in 10 fms. mud (W.J. Eyerdam); Akutan Island, Aleutian Islands, dredged 1934 (I. Norberg) (W.J. Eyerdam).

Cylichna nucleola (Reeve),1855. Arctic Ocean to Kodiak Island, Alaska. Circumboreal. Type locality, North of Beechy's Island, Arctic.

Dr. A. Myra Keen (Per. Comm. March,1945) " I enclose a tracing of the original illustration. You will see that the dimensions are slightly different from the Oldroyd specimen, but there seems to be some variability. If my determination is correct, the range of C. nucleola should be revised to 57-72 (Kodiak I. to Arctic.)"

Cylichna occulta(Mighels), 1841. Circumboreal. Point Barrow to Aleutian Islands" (Dall,1921). Johnson gives the Atlantic range as " Greenland to Maine". Type locality, Westbrook, Maine. Described from a fossil. fide Oldroyd, p. 40.

Dr. A. Myra Keen advises (Per. Comm. March,1945) " C. occulta(Mighels is another doubtful species. I enclose a tracing of the original figure from which you can realize the impossibility of recognizing it. One would need topotypic specimens for comparison, which we do not have."

Cylichna diegensis (Dall),1919. Santa Monica, Calif. (Burch) to Cape San Lucas. Dr. Dall in Bulletin 112 listed Vancouver Island ?

This species is distinguished by the anterior projection of the aperture and the much thickened pillar lip. It is truncate at the apex and is shorter and fatter than C. attonsa. It has a perforated apex. The original description mentions "... the apex exhibiting a funicular depression ending in a minute perforation". Dr. A. Myra Keen writes (Per. Comm. March 1945) " We have one very worn specimen which is being sent you on loan. It shows the funnel-shaped apex mentioned by Dall. This specimen was identified by Dr. Dall himself." We are figuring this specimen on our plate. It seems to be quite a distinct species, in our Recent material. However, Mr. George Willett observes (Per. Comm. March,1945) " There has been much confusion between this species (referring to C. alba), diegensis, and attonsa in literature, particularly in publications about fossils. In the Del Rey fossils I found specimens that appeared to connect the two latter species, but have not found them in the Recent."

Collecting data: Dredged off Santa Monica, Calif. in 20 fms., off Avalon, Catalina Island in 25 fms., off Redondo Beach, Calif. in 25-50 fms. one record off Redondo in 75 fms., Rocky Point in 40 fms., Malaga Cove in 15 fms. (Burch); San Pedro, Catalina Island, Point Loma in 20-30 fms. (G. Willett).

Los Coronados (Willett
Cylichna attonsa (Carpenter), 1864 Kodiak Island, Alaska to San Diego, Calif. Dr. A. Myra Keen states (Per. Comm. March,1945) " C. attonsa (Carpenter), 1864 (not 1865). Synonym not previously mentioned: C. propinqua E.A. Smith, Ann. Mag. Nat. Hist., ser.4, vol.9, 1872, p.351, type locality, Vancouver Island. The range as given by Dall and copied by me is obviously incorrect, as the type locality of C. attonsa is Puget Sound. According to specimens in our collection the range should be 33-56:45 (i.e. San Diego to Kodiak Island, Alaska."

This species is more elongate than C. diegensis. The aperture is very narrow for 2/3 of the length and then widens out below. Columella slightly twisted. Rounded off at apex. Apex not perforated as in C. diegensis not folded as in C. alba.

Collecting data: Ketchikan, Craig, Forrester Island, Alaska to Los Coronados in 10-15 fms. (G. Willett); 10-40 fms. in sand and mud off Monterey, Calif. (A.G. Smith); Santa Monica,Calif. in 20 fms., Malaga Cove in 10 fms., Redondo Beach in 25 fms., Todos Santos Bay, L.C. in 35 fms. Our experience has been to find this species less common than diegensis. (Burch).

On the following page we will give you a key to species from the note book of Mr. A.M. Strong. Mr. Strong covered the species from Point Conception south. This includes some of our species, those from southern California, and the species from the southern fauna.

Genus Cylichna

Columella simple, without plaits ....(Cylichnium)

. Length less than twice the diameter

9.75 x 5 mm Panama Bay, 1270 fms. ...... pizarro Dall ,1908

. Length more than twice the diameter

.. Shell with microscopic incised spiral lines

9.0 x 4.0 mm Panama, 322 fms. .... atahualpa Dall, 1908

.. Shell with microscopic lines of growth only

8.0 x 3.5 mm Santa Monica to Cape San Lucas diegensis Dall,1919

Columella with plaits

. Columella with a single plait .... (Bulinella)

.. Shell smooth, without a spiral sculpture

Dountful west coast .... alba Brown,1827

.. Shell with incised microscopic spiral lines

...Length 1½ x the diameter

2.6 x 1.5 mm Gulf of Calif. to Panama ..... defuncta Baker & Hanna

... Length 2 or more times the diameter

.... Shell more than 7.5 in length

..... Apical lip rising little above the apical pit

9.5 x 3.7 mm Kodiak Id. to Los Coronados ... attonsa Carpenter,1864

..... Apical lip rising well above the apical pit

8.9 x 4.0 mm Gulf of California .... fantisma Baker & Hanna

.... Shell less than 7.5 mm in length

..... Apical lip not rising above the apical pit

6.0 x 2.5 mm Panama, 1270 fms. .... inca Dall,1908

.....Apical lip rising well above the apical pit

...... Incised spiral lines fine, close spaced

6.7 x 3.2 mm Panama ....stephensae Strong & Hertlein

...... Incised spiral lines strong, well spaced

4.9 x 2.3 mm Panama .... valeronis Strong & Hertlein

. Columella with two plaits

.. Length 2 times the diameter

3.0 x 1.6 mm Panama ....tabogaensis Strong & Hertlein

.. Length 2½ times the diameter

3.0 x 1.2 mm Panama .... zeteki Bartsch,1918

ADDITIONS AND CORRECTIONS

Minutes #47, p 7 - continuation from bottom of page under Corolla vitrea (Heath and Spaulding),1901 which was described as Cymbuliopsis. The original description follows; with note from Dr. A. Myra Keen (Per. Comm. March,45.

" Cymbuliopsis vitrea, a new species of Pteropod" by Harold Heath and M.H. Sapulding, Proc. Acad. Nat. Sci. Philadelphia for 1901, publ. Oct.29,1901, pp. 509-511, 1 text-figure, was evidently overlooked by Dall and successors. I did not attempt to comb the literature back of 1907. Heath and Spaulding indicate in a footnote that Cymbuliopsis must fall as a synonym of Corolla Dall, so that we should cite this as Corolla vitrea (Heath and Spaulding). Their description is mostly discussion. The following may be taken as the essence:

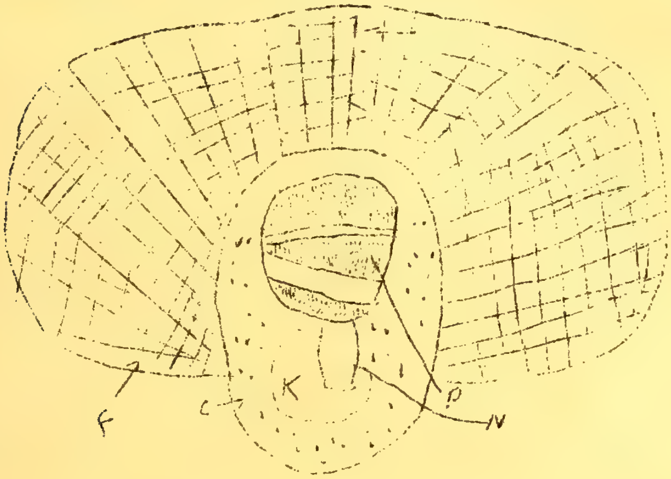
" The shell or casque, slightly asymetrical, possesses the characteristic slipper form and bears on its external surface numerous small rounded tubercles which become smaller and more closely grouped together near the posterior-dorsal surface. Its aperture is large, unarmed and much wider than in C. ovata,but is almost identical with that of C. calceola, and as in the latter, its large cavity extends to the dorsal extremity. The

maximum length of the casque is 4 cm., with a width of 2.5 cm.

" The broad, perfectly symmetrical flattened proboscis constituting the head region is in contact with the upper surface of fin, yet free from it to a point immediately in front of the central nervous system...."

Below is a tracing of the original text figure which was accompanied by the following explanation:

" Cymbuliopsis vitrea, ventral view, natural size. C.,casque or 'shell f., foot or fin; k. kidney within mantle cavity represented by stippled line; n. , nucleus or viceral mass, showing termination of intestine and pigmented cap; p. pallial gland."



Minutes #35, p.6 and Minutes #45, p.6- The range as stated in our list is Craig, Alaska to Newport Bay. Mr. W.J. Eyerdam took the species Pecten hericius pugetensis I.S. Oldroyd,1920 from Hinchinbrook Island, Alaska (Norberg).

Minutes #35, p.6 and Minutes 45, p.6. The range as we stated it is from Forrester Island, Alaska south. It should read Izhut Bay, Alaska south. This is an extension of range some 700 miles N. westward. Eyerdam dredged the species P. hindsii jordani Arnold at Izhut Bay, Afognak Id., Alaska in 1922.

Minutes # 35, p. 14a and Minutes #44, p.7. The range as published is from Forrester Island south. W.J. Eyerdam collected the species Lima subauriculata Montagu in 1922, at Izhut Bay, Afognak Island, Alaska. This is a northward extension of range of some 700 miles.

Minutes #45, p.11- Astarte arctica Gray,1824. In Minutes #39, p.6 we listed the collection of this species by Mr. W.J. Eyerdam from Hinchin-brook Island, but negected to alter the range in the final list. The range should read. to Hinchinbrook Island westward. This is an extension of range of about 600 miles.

Minutes #40 p 7 and # 45 p 13- Lucina californica Conrad,1837. Range as published was Crescent City, Calif. south. W.J. Eyerdam reports the species from sandy beach at Alki Point, Seattle, Wash and also Harbor Island. This is an extension of range of about 500 miles northward.

Minutes # 42 p 19 and #45 p 16. Petricola californiensis Pilsbry & Lowe, 1932. Our published range is Monterey south. Mr. W.J. Eyerdam reports the species from Newport, Oregon which is an extension of range of some 700 miles northward.

Minutes # 43 p 14 and # 45 p 17. Macoma quadrana Dall,1916. Range extended northward about 500 miles to Hinchinbrook Id.,Alaska (Eyerdam)(Norberg).

MARINE SHELLS WITH EXTENDED RANGES OR NEW TO THE PANAMIC WEST COAST REGION.

By Walter J. Eyerdam.

In reviewing the recent book " Panamic Marine Shells" by Maxwell Smith, which covers the marine shells of the Panamic regions, I find that there are over 450 species and subspecies in my private collection that are represented. I find that many of these have extended ranges or are otherwise new to the list of " Panama Marine Shells".

Most of these shells that I have were collected during the few brief stops made by the steamer Capoc on the way to Callao in Sept.,1938 and the return to the states on the Condor in June,1939 when she stopped at Corinto,Nicauragua. Only about two hours of collecting were spent near Corinto and the tide was only ordinary. The findings proved very interesting and it is presumed that the shell fauna in this area must be exce dingly rich in species. Even with the persistent collecting of the late Herbert N. Lowe in these waters there is still much to be discovered by others of like dilligence.

1. Diadora inaequalis inaequalis Sowerby.
   Previous range.. Lower Calif. to Taboga Id.
   Extended range.. Talara,Peru (about 1000 miles south.)
2. Acmaea subrotundata Carpenter.
   Previous range.. Panama (type locality).
   Extended range.. Gulf of Honduras (about 800 miles N.W.)
3. Acmaea stipulata Reeve.
   Previous range.. Panama (type locality).
   Extended range.. Gulf of Fonseca,Honduras (about 800 miles N.W.)
4. Hipponix panamensis C.B. Adams.
   Previous range.. Panama (type locality).
   Extended range.. Mazatlan,Mexico (about 2500 miles)
5. Turritella leucostoma Valenciennes.
   Gulf of Fonseca,Honduras- Not previously reported from the Pacific .
6. Cerithidea hegewischii pulchra C.B. Adams.
   Previous range- Panama Republic
   Extended range- Corinto,Nicauragua and Gulf of Nicoya,Costa Rica. (about 800 miles N.W.)
7. Eupleura nitida Broderip.
   Previous range.. Nicauragua to Bahia de Caraques,Ecuador.
   Extended range.. Acajutla,Salvador (about 200 miles westward)
8. Architectonica nobilis Bolten.
   Corinto, Nicauragua. Not reported in " Panamic Marine Shells".
9. Littorina mauritiana Lamarck.
   Panama coll. by W.J. Eyerdam. Perhaps a synonym of another species.
10. Tegula (Chlorostoma) globula Carpenter.
   Acajutla, Salvador- collected by W.J.E. for first record for Central America.
11. Columbella cribraria Lamarck.
   Corinto, Nicauragua. Not in " Panama Marine Shells".
12. Cancellaria ovata Sowerby.
   Corinto,Nicauragua. Not in " Panama Marine Shells".
13. Bifurcium harpaeformis Sowerby.
   Previous range.. Montego and Panama Bays.
   Extended range.. Acajutla, Salvador (about 700 miles N.W.)
14. Cassis canaliculata Bruguiere.
   Gulf of Fonseca,Honduras. Not in " Panama Marine Shells"
15. Leucozonia cingulata Lamarck.
   Previous range.. Gulf of California to Panama.
   Extended range.. Supe,Peru (about 1000 miles southward).

16. Oliva julietta Duclos.
    Previous range.. Central America
    Extended range.. Corinto,Nicauragua and Mazatlan,Mexico.
17. Olivella semistriata Gray.
    Corinto,Nicauragua. Not in " Panama Marine Shells"
18. Siphonaria lineolata Sowerby.
    Previous range.. Payta,Peru.
    Extended range.. Corinto,Nicauragua and Valparaiso,Chile (about 1700 miles north and 1800 miles south.)
19. Ellobium stagnalis d'Orbigny.
    Previous range.. Panama to Guayaquil,Ecuador.
    Extended range.. Gulf of Fonseca,Honduras. (about 800 miles N.W.)
20. Melampus trilineatus C.B. Adams.
    Previous range.. Panama (type locality).
    Extended range..Gulf of Fonseca,Honduras.
21. Macoma (Psammacoma) cognata C.B. Adams.
    Previous known range- Panama (type locality).
    Extended range.. Corinto,Nicauragua. (about 800 miles N.W.)
22. Macoma grandis Hanley.
    Previous range.. Central America.
    Collected by W.J. Eyerdam at Corinto,Nicauragua.
23. Mactra (Harvella) elegans Sowerby.
    Corinto,Nicauragua. Not previously reported from Central America.
24. Mactra hemphillii Dall.
    Previous range.. San Pedro to San Diego, Calif.
    Extended range.. Corinto,Nicauragua. (about 1600 miles southward).
25. Mactra (Micromactra) vanattae Pilsbry and Lowe.
    Previous range.. Gulf of Fonseca to Panama City.
    Extended range.. Acajutla,Salvador. (about 200 miles westward.)
26. Mytilus charruanus d'Orbigny.
    La Union,Salvador. First record for Central America.
27. Donax navicula Hanley.
    Gulf of Fonseca,Guatemala. First record for Central America.
28. Pseudocyrena mexicana Broderip and Sowerby.
    Previous range- Panama.
    Extended range.. Corinto,Nicauragua and Mazatlan,Mexico. (about 2500 miles N.W.).
29. Corbula nasuta Sowerby.
    Previous range.. Guaymas,Mexico to Ecuador.
    Extended range.. San Felipe, Lower Calif. collected by Earl Huffman (about 200 miles northward).
30. Solen mexicanus Dall.
    Previous range.. Gulf of Tehuantepec to San Juan del Sur.
    Extended range.. Digg's Pt., Gulf.Calif. by Earl Huffman. 900 mi. N.W.
31. Chionecrenifera Sowerby.
    Previous range.. Mazatlan,Mexico to Payta,Peru.
    Extended range.. San Felipe, Gulf. of Calif. (about 500 mi. N.W.)
32. Corbicula radiata Hanley. (brackish water)
    Collected by W.J. Eyerdam at Corinto,Nicauragua and Gulf of Fonseca, Honduras in Mangrove swamps.. not previously reported from this region.
    Corbicula radiata Deshayes, and Corbicula radiata Parr. are synonyms of Corbicula fluminalis Deshayes and are native to Egypt, according to Temple Prime in his catalogue of the Corbiculidae.

Genus Bulla Linnaeus,1758. (continued from bottom of page 21)

Bulla casta (Carpenter),1864. Catalina Island to Gulf of California.

Collecting data: Catalina Island (A.M. Strong); San Pedro, fossil (G. Willett).

Type locality (fide Oldroyd), Cape San Lucas, Lower Calif.

Bulla nonscripta (A. Adams), 1850. San Diego, Calif.

Collecting data: " I have what I thought might be this species from Catalina Island in 60 fms.,and fossil, but it differs from Tryon's figure and I do not know what it is." (G. Willett).

Bulla chimera (Baker and Hanna),1927. This species is of the southern fauna ranging from Lower California to Acapulco, Mexico. It seems to be the only other described species from this coast.

Bulla esteroensis, new species. Plate II, fig.24.

Shell ovate in outline; color mottled brownand white; sculpture of spirally incised lines over the entire body whorl, more prominent on the lower one third; spire sunken with a deep pit the sides of which are striate with seven spiral grooves; aperture produced both posteriorly and anteriorly but more produced posteriorly; aperture extends behind the inner lip as it joins the body whorl; outer lip gradually curved becoming more acutely curved as it approaches the columella; inner lip descends upon the inner edge of the sunken spire, lip twisted behind the vertex; columella twisted and faintly grooved with a shallow chink behind it. Height 3 3/4 mm.; diameter 2 1/5 mm.

The type specimen from the Estero de Punta Banda below Ensenada, Mexico has been sent to the U.S. National Museum. A paratype is in the Burch collection and it seems that a specimen from San Diego in the Stanford University collection, # 27554, (Plate II, fig.21) is of this species.

Bulla nonscripta (A. Adams),1850 (Plate II, fig. 23) has a straight outer lip whereas that of B. esteroensis is decidedly curved. It is also obvious that the general form of B. nonscripta is cylindrical whereas that of B. esteroensis is ovate. Bulla casta (Carpenter),1864 is much more elongate and is also much more swollen anteriorly.

John Q. Burch.

Figure Explanation of Plate

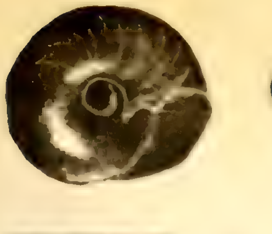
1. Spiratella pacifica(Dall) Forrester Island, Alaska(Willett) x4
2. " " Redondo Beach,Calif. 75f.(Burch) x 4
3. Cavolina laevigata Orb. Catalina Island, 30 f. (Willett) x 4
4. " tricuspida (Rivers) Catalina Id. (Willett) x 4
5. Clio exacuta Gld. Catalina Id. 200 f (Willett) x 4
6. Styliola falcata Gld. Catalina Id. 30 f. (Willett) x 4
7. Acteon painei Dall. Catalina Id. 30-40 f. (Strong) x 3
8. Acteocina culcitella (Gld.). Redondo Beach 100 f. (Burch) x 3
9. " intermedia Willett. Redondo Beach 75 f (Burch) x 3
10. " " " " " " (oblique view).
11. " eximia (Baird). Friday Harbor, Wash. (Kincaid) x 3
12. " " " " " " (oblique view)
13. " magdalensis Dall. Newport Bay (Strong). x 3
14. " inculta (Gld.). San Diego Bay (Baker) showing gradation to
" planata (Carp.) from the same set.
15. " smirna Dall. San Martin Island (Baker) x 3
16. Coleophysis harpa (Dall). Friday Harbor, Wash. (Kincaid) x 3
17. Volvulella cylindrica (Carp.). Redondo Beach 30 f (Burch). x 3
18. " tenuissima Willett. Redondo Beach 75 f (Burch) Paratype.
19. " californica Dall. Redondo Beach 100 f m. (Burch) x 3
20. Bulla casta (Carp.) San Pedro Pleistocene (Willett). x 3
21. Bulla esteroensis Burch. San Diego,Calif. (Baker:Stanford Coll.27554
22. Bulla chimera (Baker & Hanna). Oaxaca,Mexico,50 f. (Willett). x 3
23. Bulla nonscripta (A. Adams). Sowerby, Thes. Conch.,1844, vol.2,pl.125
24. Bulla esteroensis Burch. Estero below Ensenada. Type specimen. x 3
25. Bulla cf. nonscripta (A. Adams). Catalina Island, 60 f. (Willett).
26. Diaphana californica Dall.Redondo Beach, 50 f (Burch) x 3
27. Brocktonia polystrigma (Dall). Newport, Calif. 20 f. (Strong). x 3
28. Cylichna diegensis Dall. La Jolla, Calif. 100 f. Stanford Coll. x 3
29. " " " " " " (Oblique view).
30. " " " Redondo Beach, 50 f M. (Burch) x 3
31. Cylichna attonsa Carp. Redondo Beach, 25 f. G. (Burch). x 3
32. Nuculana penderi redondoensis Burch. Redondo Beach,25f. Type.(MQ 454)
33. " " " inside, x 2.5 Type.
34. " " " 2 other spec. from Redondo Beach 25 f. G. x1.5
35. " " " 2 spec. fr Redondo Beach 75 f. M. x 1.5
36. " " " San Pedro, Calif. 20 f (Willett) x 3
37. " " " Santa Cruz Island 50 f (Burch) x 1.5
38. Nuculana penderi Dall. Craig,Alaska (Willett)(Burch MQ452) x 3
39. " " " " 6 spec. x 2.5
40. Cardita ventricosa redondoensis Burch. Redondo Beach,100f.Type x 2.5
41. " " " " " " (Burch MS443)
42. " ventricosa Gld. San Juan Islands, Puget Sound. MS442 x 2.5
43. " " " showing spawn inside shell x 1
44. " " " " inside of shell x 1
45. " " " Puget Sound (Kincaid) (Burch MS4516) x 2.5
46. Macoma morroensis Burch. Morro Bay,Calif. Type. (Burch) x 1.5
47. " " " " "

48,49 Macoma yoldiformis Carp. Newport Bay (Caruthers). x 1.5

50,51 Macoma alaskana Dall. Forrester Island,Alaska (Willett). x 1.5

Note: All magnifications are only approximate.

PLATE II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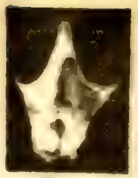
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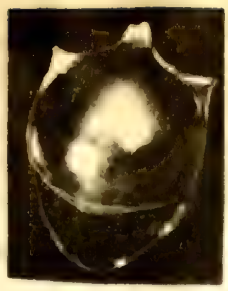
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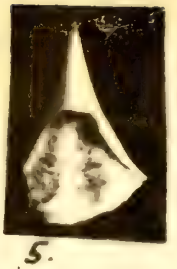
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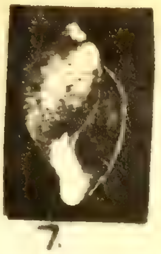
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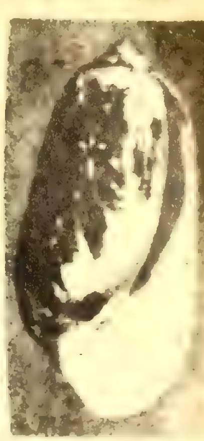

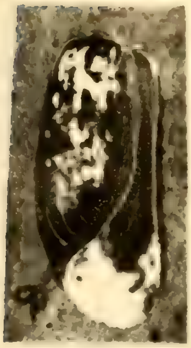

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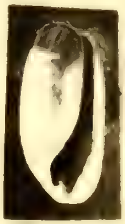
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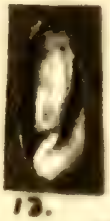
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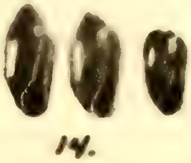
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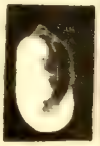
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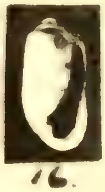
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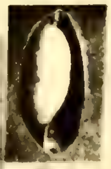
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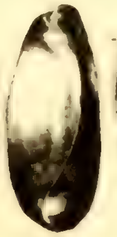
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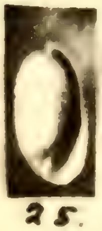
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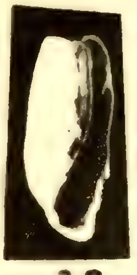
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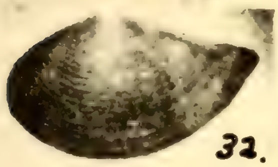
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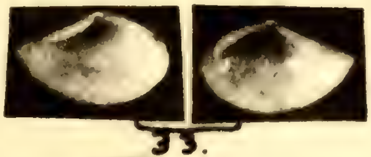
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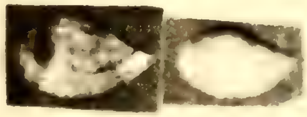
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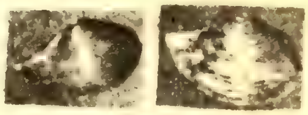
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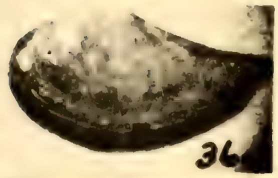
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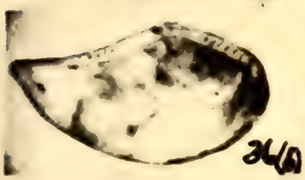
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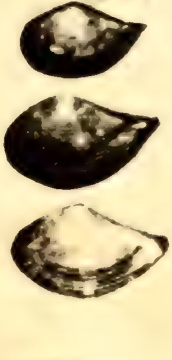
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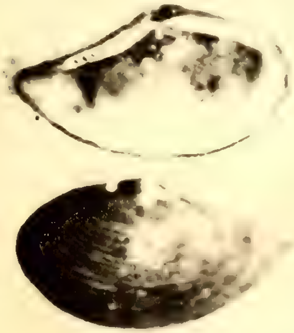
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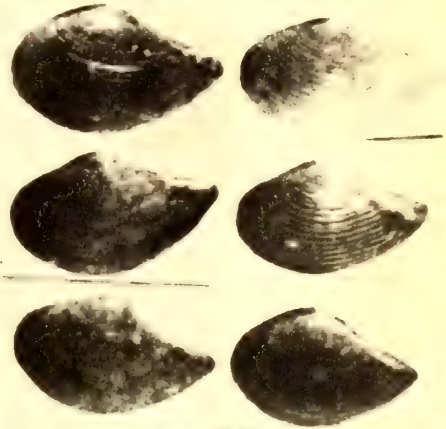
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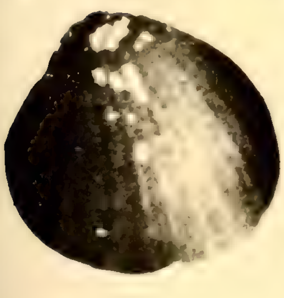
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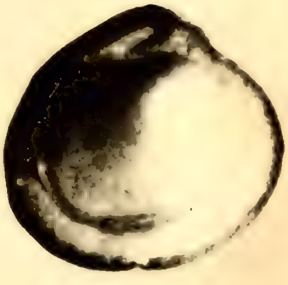
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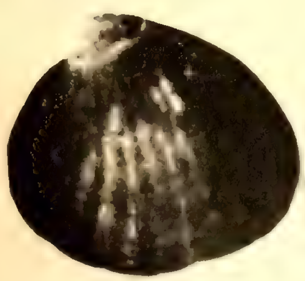
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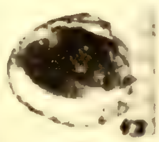
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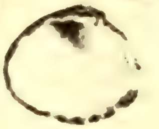
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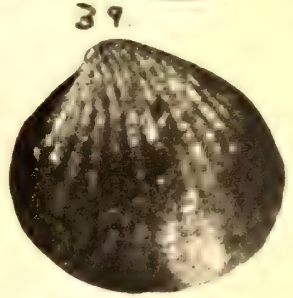
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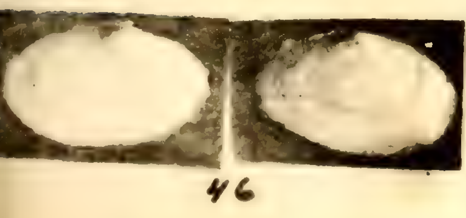
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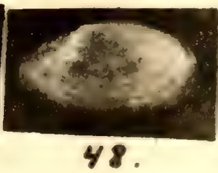
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Nuculana penderi redondoensis Burch,1944. Plate II, figs. 32,33,34,35,
36,37

Shell solid,elongately trigonal, rounded anteriorly, with a sharp posterior beak, equivalve, color light brown. Anterior end shorter than the posterior, the dorsal margin slowly descending and then regularly convex to the ventral margin. Posterior end longer, with a sharp beak, the dorsal margin slightly descending and decidedly concave. Sculpture consists of concentric sharp ridges, close together near the umbones but further down the interspaces are broader than the ridges. Escutcheon very prominent, longitudinally striate, and bounded by a sharp median keel formed by the posterior dorsal margins of the valves. The lunule is an indistinctly outlined narrow space, striate. Hinge teeth V shaped, numbering 18 anterior and 14 posterior. Length 8 mm.; maximum height 4½ mm.; maximum diameter 3.8 mm.

In Minutes #33, pp 9-10, March,1944 the species *Nuculana redondoensis* Burch, was figured and the differences between the species and the Atlantic *Nuculana acuta* Conrad was clearly shown. The possibility that *redondoensis* might be not more than subspecifically distinct from the northern *N. penderi* Dall,1910 was discussed. Further study and a comparison with a large series of *N. penderi* has convinced the author that while *redondoensis* is easily separable, the relationship is so close that it should probably be described as a subspecies of *N. penderi*. A comparison of this species with *N. penderi* from Craig, Alaska,collected by Mr. George Willett (see Plate II, figs. 38 and 39) brings out among other differences in shape that *N. p. redondoensis* is in fact more elongate. However, the most obvious difference is that specimens of *N. p. redondoensis* tend to be consistently more rostrate and more pointed with a greater curve in the posterior dorsal margin.

A type specimen, dredged off Redondo Beach, Calif. in 25 fathoms on gravel bottom, has been selected and placed in the U.S. National Museum. Paratypes will be available for all western museums wishing them.

John Q. Burch.

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Cardita redondoensis Burch,1944. Plate II, figs. 40 and 41.

Shell suborbicular, slightly inequilateral, with 22 to 24 well defined rounded nodulose radiating ribs. The concentric sculpture consists of flat plates when viewed under a strong lens. The entire shell is covered with a light brown hairy epidermis. The umbones are slightly eroded. Length 14½ mm.; height 13.8 mm; diameter 10 mm.

In Minutes #39, pp 14,15,16 a species was discussed and figured which was given the subspecific name *Cardita ventricosa redondoensis* Burch,1944. Further study has convinced the author that this species is sufficiently distinct to warrant a specific name. A type specimen, from 100 fathoms off Redondo Beach on mud bottom, has been selected and placed in the U.S. National Museum. Paratypes will be available to western museums wishing them.

The most obvious difference between this species and *C. ventricosa* (see Plate II, figs. 42-45) is that it is more ventricose. However, in addition to the difference in dimensions, a study of the sculpture will reveal that the radial ribs are much more pronounced on *redondoensis*, and there is a distinct difference in the character of the concentric

sculpture, that of C. ventricosa consisting of inconspicuous nodular incremental lines, whereas that of redondoensis seems to assume the form of a series of flat ' plates'. John Q. Burch

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In Minutes #39, p. 13, September,1944, the name Cardita bailyi Burch was proposed to replace the name Cardita nodulosa Dall,1919, the specific name nodulosa being preoccupied by both Lamarck and Reeve.

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A NEW MACOMA FROM CALIFORNIA

BY Thomas A. Burch

Many collectors from California have specimens of an undescribed species of Macoma either in their sets of M. yoldiformis or labelled with question marks. Most of these specimens have come from Morro Bay, San Luis Obispo County,Calif. We have also dredged them from 10 fathoms off Monterey, Calif.

Macoma morroensis sp. nov. Plate II, figs. 46 and 47.

Shell small,shiny white, elliptical, compressed,height three fortths the length of the shell; umbones posterior to midline, nearly equilateral; anterior end elongated and bluntly curved; posterior end obtusely angulated and reflected slightly to the right at the posterior tip. Ligamental area nearly straight. Sculpture consists only of obscure incremental lines of growth; teeth minute; pallial sinus deep and high. Length 21; posterior to hinge 3.5 ; height 12.5 mm.

This shell is similar to Macoma yoldiformis Carp. (Plate II, figs. 48,49) but is proportionately much higher, the height being 3/4 the length in M. morroensis and only $\frac{1}{2}$ the length in M. yoldiformis. The posterior end of M. morroensis is less attenuated and lacks the "scooped out" ligamental area of M. yoldiformis.

Macoma alaskana (Plate II, figs. 50,51) differs from this species in that the umbones are much further posterior and the ligamental area slopes abruptly down, resembling Tellina buttoni somewhat in shape.

The type specimen from Morro Bay, California has been sent to the U.S. National Museum. Paratypes are in the collections of M. Caruthers , George Willett, and the Burch collection.

The specimens from Morro Bay are all practically identical, but those from Monterey in the Burch collection vary considerably in height but all are proportionately higher than M. yoldiformis.

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Rutgers University Library, New Brunswick, New Jersey. We are pleased to ship this institution a file of all of our available back issues and place them on our mailing list for future issues.

Professor Louis Brand, University of Cincinnati, Cincinnati, Ohio. " Your check list of Pacific Pelecypoda is a very useful piece of work for which you deserve the commendation and thanks of conchologists. I have just had occasion to refer to it in connection with a species of Cardita which had me stumped; I thought it was ventricosa until I examined Tom's enlarged drawings.

If you need any cash in order to continue with your photographic reproductions why dont you make a general levy on your subscribers ? I feel sure that everyone recognizes the value of your work and will be glad to chip in.

Are you interested in a list of shells for the Minutes that my daughter collected at Arica,Chile? Although Dr. Hertlein has named several for me there are still a few that are puzzling. No deep water species are included -- all littoral material. The Chileans call the Fissurellas " lapas", the Concholepas " locos" (I have just discovered that this shell has an operculum, a sort of molluscan vermiform appendix /); and the black edible mussels are " almejas".

We will answer the last question here. To be sure we will be very happy to run a list of littoral shells collected at Arica,Chile.

Ralph B. Bormann, A.S. 735-73-55 U.S.N.R. Pre Misshipmen's School, Princeton New Jersey. This Ralph's latest address.

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In our Distributional List of the Pelecypoda we listed the species Nucula exigua Sowerby,1832. The name Nucula suprastriata Arnold,1903 (ex Carpenter MS) was omited from out faunal list on the theory (fide Grant and Gale,1931), that it is in the synonymy of N. exigua. However, the name suprastriata was used by many of the early authors including Keep in early editions, Arnold etc. Consequently many sets of specimens were given this label and are in local collections. Recently some specimens from San Pedro so labelled by Dr. Tremper were submitted to me for study. They are of course, identical with the shells we classify as N. exigua Sowerby. Dr . A. Myra Keen of Stanford University has given us a statement on this matter (Per. Comm. April,1945) " Nucula (Nucula) suprastriata Arnold,1903 (ex Carpenter MS), was described from the Pleistocene of San Pedro, and as yet we have seen no valid Recent specimens. The principal difference between this and exigua is size. The average length of exigua is 4.6 mm., of suprastriata 5.8 mm. No specimens of exigua that we have seen are longer than 5.2 mm., while suprastriata may attain a length of 7.0 mm."

Nucula bellotii A. Adams. In Minutes # 33, p. 8 we discussed this species. Some southern Calif. specimens have been so classified in error. The following statement by Dr. A.M. Keen is if value on this species." Nucula(Ennucula) bellotii A. Adams,1856, is the first available name for N. inflata Hancock, 1846, preoccupied, and N. expansa Reeve,1855, also preoccupied. The type locality is " Arctic seas", where it seems to be widely distributed. A figure of expansa is given by Mrs. Oldroyd(vol.1,1924,pl.13, figs.6-7). The holotype is figured by Schenck in 1939. The species N. quirica Dall seems to be a synonym; at least, all of the characters mentioned by Dall as diagnostic fall within the range of variation of N. bellotii."

#47 Back Page April,1945

ADDITIONS AND CORRECTIONS

Minutes #43 and #45 p 17- Macoma yoldiformis Carpenter,1864. Reported from Hinchinbrook Island, Alaska, dredged on muddy bottom (Norberg) (W.J. Eyerdam). This is an extension of range northward.

Minutes #45 p 19- Mya japonica Jay,1857. Mr. W.J. Eyerdam has called attention to the fact that we omited the geographic range in our list for this species. The range is according to Grant and Gale " Arctic Ocean to Japan and Monterey, Calif.: probably also Atlantic".

Minutes #45, p. 19. Panomya turgida Dall,1916. We published the range as Unalaska to Schumagin Islands. Mr. W.J. Eyerdam reported the species from a sandy beach on Sitkalidak Island, Alaska,1931 which is an extension of range of about 200 miles northeast.

Minutes #42 p 20 and # 45 p 16- Cooperella subdiaphana (Carpenter),1864

Mr. A.M. Strong told at a recent meeting of the club of having collected this species in Alamitos Bay. They were of a decided pink colot leading him to think at first sight that he had something different. The solution was that they were spawning which gave them this color.

Minutes #44, pp 3-35. In this issue we discussed the family Mactridae . The following comments were received after our paper came out. It is from Allyn G. Smith " Spisula hemphilli ranges as far north as Monterey as there is a single valve in the Gordon collection that is unquestionably this species. It looks to Hertlein and me that M. nasuta is a rare species that you might find occasionally in Southern California; also M. dolabriformis , which definitely does not occur at Monterey and probably is more likely a Lower Californian species. I have two good specimens of planulata from Puget Sound, which are larger than some I collected at San Pedro years ago." The information in this note means extensions of our published ranges for two species as follows:

Minutes #45 p 18- Spisula hemphilli (Dall),1894. Our range is to be extended northward to Monterey, Calif. (A.G. Smith). and Spisula planulata (Conrad),1837. Our range is extended northward from Monterey to Puget Sound (A.G. Smith).

Minutes # 43 p 20- Donax californica Conrad,1837. Additional records: Corinto, Nicauragua,1938 & 1939 on sandy beach (W.J. Eyerdam); slough at Imperial Beach; San Diego Bay; Magdalena Bay (San Diego Museum Nat . H.

Min. #43-p 20- Donax gouldii Dall- Los Coronados Islands,Coronado Beach, Ocean Beach, La Jolla (Miss V. Bristol).

Min. #43 p 21- Donax punctatostriatus Hanley- Supe, Peru,1938 & 1939,on sandy beach (W.J. Eyerdam); Acapulco, Mazatlan,Manzanillo,Mex., Kino Bay, Tres Marias Islands (H.N. Lowe).

Min. #43 p 21- Donax conradi Deshayes,1854. Ensenada, Lower Calif.(Lowe).

Min.#42 p 20 and #45 p 16- Cooperella subdiaphana (Carpenter)- San Felipe, L.C., Newport Bay, Alamitos Bay (H.N. Lowe); Mission Bay(Orjala).

Min. # 43 p 21- Gari californica (Conrad),1848. Bainbridge Island, Kitsap Co., Wash., 1944 (W.J. Eyerdam); San Diego Bay, San Pedro, San Onofre, Puget Sound, Sitka,Alaska (Miss V. Bristol); common in Mission Bay(Emerson

Min #43 p 21- Gari regularis Carpenter,1864. One specimen from 25 fms . Catalina Island (H.N. Lowe).

Family VESICIDAE

Genus Vesica Swainson,1840. Type (by subsequent designation, Gray, 1847), Bulla ampulla Linnaeus.

This is the family known from many authors as Bullidae,Bullariidae, and the genera Bulla,Bullaria. The explanation of the necessity for this change in nomenclature is taken care of in Minutes #47, pp 20,21.

" Shell oval or ovate, compactly involute, generally solid and with a mottled cloour-pattern; spire sunken, umbilicated; aperture as high as the shell, rising slightly above the vertex, its upper portion narrow,expanded toward the base; lip simple, flecuous; columella short and concave, with a crescentic white reflexed callus; parietal wall smooth, with a light callus"

Vesica gouldiana (Pilsbry),1893. Santa Barbara, Calif. to Mazatlan,Mexico . Type locality not stated in the original description but stated by Mrs. Oldroyd to be Guaymas, Mexico. This species was known to early authors as Bulla nebulosa Gould,1850.

Collecting data: This large species is our common species found in all sloughs and bays. It has a characteristic mottled coloration and is microscopically granulose, Our experience has been to find it seasonally very abundant, usually in the greatest numbers in May,June and July, in Mugu Bay, Ventura Co., Anaheim Bay, Alamitos Bay, Newport Bay, Estero below Ensenada, etc. In Mugu Bay it is found in great numbers just beneath the surface of the mud and around the eel grass. The bathymetric range of this species is os some interest. It is not confined to the bays and we have dredged it in water as deep as 25 fms. off Catalina Island.(Burch); common in Mission Bay (W.K. Emerson); Glorietta Bay, Coronado (Bristol); San Diego Bay near National City (Brown); San Diego Bay (Hemphill); Catalina Island, Calif. Alamitos Bay,Tepoca Bay off Tiburon Island, Gulf of Calif., Kino Bay,Sonora, Pta. Penasco,Guaymas,Pts. Libertad,Sonora, Angeles Bay, Gulf of Calif. (H.N . Lowe); Magdalena Bay, Lower Calif. (Lowe and Harrison);

Vesica punctulata (A. Adams),1850. " Gulf of California to Lobos Islands, Peru" (Dall,1910). This species is not of our Recent fauna but has been reported in error from California in a number of lists. Mr. George Willett notes " Common in some of our late Pleistocene deposits, but not seen living north of Ensenada." While this is a very distinct species with a much less obese body whorl, it could possibly be carelessly confused with the above species. A discussion of this species is given by Grant and Gale,1931, p.456. There is no description of this species in Oldroyd. The species is reported by H.N. Lowe from the following Mexican localities: La Paz, Mazatlan, Tres Marias Islands, Manzanillo, Acapulco, San Juan del Sur, Taboga Island,Montijo Bay.

Vesica quoyana (Dall),1919. (new name for " Bulla quoyii Gray" of A. Adams) Catalina Island, Calif. to Acapulco, Mexico (Dall). Dr. A. Myra Keen (Per. Comm. March,1945) states " Figures cited in USNM Bull. 112 are of punctulata The correct citation should be, Thes Conch., vol. 2, pl. 123, fig.71, 1850; Manual Conch., vol. 15, pl.34, fig.9. Type locality, Galapagos, fide Adams. Either this is incorrect or Dall's stated range to Acapulco, Mexico is incomplete."

Mr. A.M. Strong (Per. Comm. March,1945) clearly states the problems involved in the study of this species as follows:

Bulla quoyii A. Adams in Sowerby, Thes. Conch. vol.2,1850,p.123,pl.123,f. 71.

Bulla quoyii Gray in Carpenter, Mazatlan Cat., p. 173 and Smith. Misc. Coll., p. 132.

Bulla quoyii Gray in Reeve and Tryon.

Not Bulla quoyii Gray MS in Diaffenbeck,1842

Diaffenbeck stated that Gray's MS shell came from New Zealand. Carpenter states (Smith. Misc. Coll. p.5) that many of his localities were in error and that Bulla quoyii probably came from the west coast. If so it is a valid name for the west coast.

Carpenter gave the same reference to page and figure in Thes. Conch. as Dall for Bulla quoyii but gives the authority as Gray, not A. Adams as does Reeve and Tryon. Which is correct ?

In any case Dall apparently considered that the Gulf and California shell that Carpenter identifies as Bulla quoyii is not the same as that given by Diaffenbeck and gives it a new name, Bulla quoyana.

I know of no records of it having been found except those of Dall and Carpenter tho it has been reported fossil by Jordan from Magdalena Bay. The descriptions and figures in Reeve and Tryon as of the Galapagos shell as stated and may not be the same as the Gulf shell identified by Carpenter.

This is badly mixed up. However, I think the answer would be that if Bulla quoyii has been recognized by later collectors from New Zealand,it will have to be restricted to that fauna. If it is not reported from there it will have to be used for the Galapagan shell. If this is the same as the Gulf shell Dall's new name, quoyana, was not needed. If the Gulf shell is distinct from the Galapagan shell Bulla quoyana Dall can be used and range given as Gulf of California to Catalina Island."

The original description of Adams in Latin is given in Mrs. Oldroyd's work, Vol.II, Part I, p.41 and also Sowerby's description. The following additional references from Sowerby may be of interest to those following up a study of these confusing species."Bulla quoyii (pl. cxxiii. f. 71), Gray, MS, Brit. Mus. Sowerby, G.B. Jr. Thes. Conch. 1855, p. 576-577, sp. 48." " Galapagos Islands; coral sand, 6-8 fatgoms,. Cuming.Mus.Cuming"

Mr. George Willett calls attention to the following " According to Tryon, Bulla quoyii A. Adams is a synonym of B. punctulata A. Adams."

There is a general feeling of uncertainty about what this species really is. Miss Viola Bristol of the San Diego Museum reports that she has taken it at La Playa, Pt. Loma, Calif. and also that it was taken in San Diego Bay by Hemphill. It will be interesting to study these specimens.

Family AKERIDAE

Genus Haminoea Turton and Kingston in Carrington,1830. Type (by mono-typy) Bulla hydatis Linne.

" Shell thin and rather fragile, unicolored, corneous, yellowish or greenish, covered with a thin cuticle, globose, ovate, or cylindric-oval, the spire sunken and concealed, vertex concave, imperforate or minutely perforate; body-whorl large; aperture as long as the shell, broadly rounded below, narrow above; columella simply concave,thin, its edge narrowly reflexed, showing a slight fold where it joins the body of the shell; lip retreating above, but not distinctly sinused. "

Mr. A.M. StrOng (Per. Comm. March,1945) gives a clear statement of some of the problems involved in a study of this genus.

" Carpenter reported a Haminoea hydratis Linnaeus from Vancouver in Smith. Misc. Coll. pp 89,132 and stated " Exactly accordes with the European specimens". This is almost certainly the shell described as Haminoea olgae Dall,1919. This is a northern shell only differing from Haminoea vesicula Gould by small differences in the shape of the aperture. The south-

-thern records are probably not correct, The Gulf of California shell is Haminoea angelensis Baker and Hanna which can only be separated from Haminoea vesicula Gould by a careful examination of specimens.

Carpenter describes Haminoea cymbiformis in Mazatlan Cat., p. 174, from " Only one rather imperfect specimen". It measured approximately 1.75 by 1.25 mm. and could have been the very young of several different things . The name should probably be placed in the indeterminate list.

Haminoea virescens Sowerby may be valid for our small shell, depending on whether or not a shell answering this description can be found at Pitcairn Island. Our shell has been named Haminoea dalli Bartsch.(T.S. Oldroyd, Proc. U.S.N.M., vol.65,Art.22, p.9,1925). Again I question the Mexico record. The Gulf of California shell is Haminoea strongi Baker and Hanna, which was long confused with Haminoea virescens Sowerby. Bartsch also described a var. excolpa which is a bay form, nearly white with a thin epidermis."

Haminoea virescens(Sowerby), 1833. Puget Sound to Puerto Libertad,Mexico . Type locality, Pitcairn Island, southwestern Pacific (?).

The name H. cymbiformis Carpenter is proposed by Grant and Gale,1931 to replace in our fauna the name H. virescens Sowerby . The name virescens is attacked because the type locality is Pitcairn Island which sounds fantastic, but if our shell is the same as the Pitcairn Island shell then obviously the correct name is virescens. Dr. A. Myra Keen asvises " H. virescens is probably the correct name. See Tomlin, Nautilus vol.47, no.1, p. 37. Pitcairn Island may well be an erroneous location. Mr. George Willett notes " I would use virescens, at least for now." Dr. Pilsbry wrotean article in thw Nautilus 1933, vol. 46, pp 140-141 in which this problem is fully discussed. Dr. Pilsbry favors the use of virescens.

In the synonymy of this species is usually placed Haminoea virescens rosacea Spicer described in Nautilus vol. 47, pp 52,53,54. Pink specimens are not uncommon. The variety rosacea was described from San Diego.

Collecting data: For such a fragile shell this species is common in the rocky rubble. We have taken it all along the coast of southern California in the tide pools and among the rocks in the most exposed locations . However, we have also taken it in protected lagoons such as Mugu, Newport Bay etc. While we did pick up a few in our dredges off Santa Monica that came from very shallow water, not to exceed 5 to 10 fms. We have never seen the genus from deeper water. (Burch) ; Mission Bay, common (W.K. Emerson); San Diego Bay (Bristol); Ocean Beach (Baker); La Jolla (Bristol).

Haminoea vesicula (Gould),1855. Southeastern Alaska to the Gulf of California, Mexico. Type locality, San Diego, Calif. Ketchikan, Alaska (Willett) is the most northern record we have. Figured in Man. Conch. vol.15,pl.4,f.28

This species is easily distinguished from virescens by the aperture and the fact that it is not constricted at the apex.

Collecting data: In our experience this is a bay form, much more fragile than the above species. We have taken it in great numbers in the lagoon at Mugu,Playa del Rey,Anaheim Bay,Alamitos Bay etc. (Burch); Elkhorn Slough seasonably abundant (A. Smith); Mission Bay, uncommon (W.K. Emerson); Big Spookum Inlet, Puget Sound, Mason Co., Wash. (W.J. Eyerdam); Imperial Beach (Banks); Magdalena Bay (Orcutt); San Diego Bay (Bristol);Santa Barbara (Orcutt); Orcus Island, P.S. (Dr. Baker)

Tracing of original figure of Haminoea vesicula [illegible] t, the Gulf of [illegible] which can only be [illegible] by [illegible]

[illegible] Cur sh [illegible] has [illegible] vol. 65, art. [illegible] Gulf of California [illegible] contines [illegible] excel [illegible]

[illegible] to [illegible] certif [illegible]

[illegible] vir [illegible] no [illegible]

[illegible] rosacea [illegible] nk specim [illegible]

[illegible] Bristol [illegible]

[illegible] Gulf of [illegible] Alaska [illegible]

[illegible] much more [illegible]

[illegible] Smith [illegible] common [illegible] Sound, Mas [illegible] Grout [illegible]

Haminoea olgae Dall,1919. Drier Bay, Knight Island,Alaska (Eyerdam) to San Quentin Bay, Lower California (Dall). Type locality, Peavine Pass, Olga,Orcas Island, Washington.

The figure of this species in Oldroyd is rather unsatisfactory and the validity of the species has been a source of a great deal of discussion. Dr. Dall in his description stated that it is a close relative of H. vesicula Gould. It has certainly been rather generally confused with vesicula if it is not in fact identical with it. Mr. George Willett advises (Per. Comm. April,1945) " I have a set from Olga,Wash. named olgae by Engberg. I can not differentiate them from vesicula. I doubt the validity of olgae."

Collecting data: Among roots of eel grass in mud- Drier Bay, Knight Island, Alaska collected by W.J. Eyerdam and identified by Dr. W.H. Dall. Dall named this shell after specimens collected by Dr. Engberg at Olga,Wash." Orcas Island (Oldroyd); Elkhorn Slough,Monterey Co. (Spicer).

Family PHILINIDAE

Genus Philine Ascanius,1772. Type (by monotypy), P. quadripartita Ascanius) -- Bulla aperta Linne).

Shell capable of containing but a small part of the body,entirely internal,covered by the reflexed and united mantle; whitish,fragile, consisting of 1 or 2 whorls; spire sunken or absent; aperture extremely large, the outer lip often produced in a lobe or point above." Suter.

Philine sinuata Stimpson,1850. Port Clarence,Bering Strait (Krause) (Dall) Also Atlantic. Johnson gives the range Maine to Massachusetts 4-7 fms. Type locality, Broad Bay, Boston Harbor.

Philine polaris Aurivillius, 1885. Arctic Sea to Nanaimo, British Columbia. Type Locality, 73 5 N, 144 20 E and 70 28 N., 164 10 E in 8-9 fms.

Philine bakeri Dall,1919. Off South Coronado Island near San Diego,Calif.

Philine californica Willett,1944. Southern California Academy of Science Bulletin, vol. 43, part 2, pp 71-73. Type locality off Redondo Beach, Calif. in 50 fms. The original description follows:

" Shell of two or more whorls, oval, inflated,slightly contracted below the apex; spire sunken, concealed, only the extreme tip being visible. Aperture very large, oval, contracted above; outer lip extended slightly above the apex and curved down to join the body whorl; inner lip thin, twisted, and flattened where it joins the body whorl in front of a minute umbilical groove. Sculpture of fine, close, rather regularly-spaced axial striae, crossed by fine, irregularly-spaced spiral striae,forming a laticed sculpture; on the upper part of the shell there are minute tubercles at the intersections of the striae. Color dull white, with a broad, light-brown band slightly above the middle.

A rather poor photograph of the living specimen shows that the animal is much too large to be contained in the shell, the head, disc, foot and mantle being outside.

The unique type, No. 1074 Los Angeles County Museum, was collected by John Q. and Tom Burch off Redondo, California, in 50 fathoms. The type measures: alt. 5.5, lat. 3.6 mm. (lip not entire).

The latticed sculpture of this little shell would place it in the Section Laona A. Adams, not previously reported from the Pacific coast of America.

Family GASTROPTERIDAE

Genus Gastropteron Kosse,1813. Type (by monotypy): G. meckeli Blainville,1825 (= Sarcopterus ruber Rafinesque,1814). (Fide Sherborn and others. Evidently the genotype was described by Kosse but not given a specific name. The first species assigned to Kosse's genus becomes the type, but in this case happens to be a synonym of a name proposed earlier by Rafinesque. The genotype, therefore, is Gastropteron rubrum (Rafinesque).

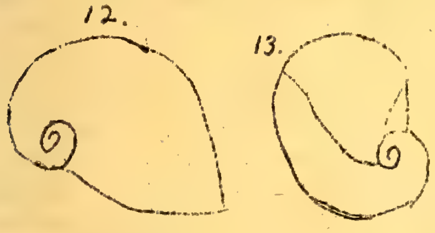
We are indebted to Dr. A. Myra Keen for the information on this genus. " Shell wholly covered, consisting of a minute nautiloid, calcareous spire and a large open last whorl of very delicate membrane or cuticle. Gastropteron swims rapidly by means of its large parapodial lobes, which are used as wings" (Tryon & Pilsbry, Man. of Conchology).

Gastropteron pacificum Bergh,1893. Aleutian Islands to Fuca Strait.(Dall)
Type locality, Unalaska, Aleutian Islands (fide Oldroyd, p. 46)
Range to Monterey Bay; rare (MacFarland) (A.G. Smith).
Gastropteron cinereum Dall,1925. Queen Charlotte Islands to Vancouver Island, British Columbia. Type locality, Skidegate Inlet, Queen Charlotte Islands, British Columbia. Described in Rept. Canadian Arctic Exped. 1913-18, vol.8, pt. B, p. 11B, text fig.4. (tracing given below).

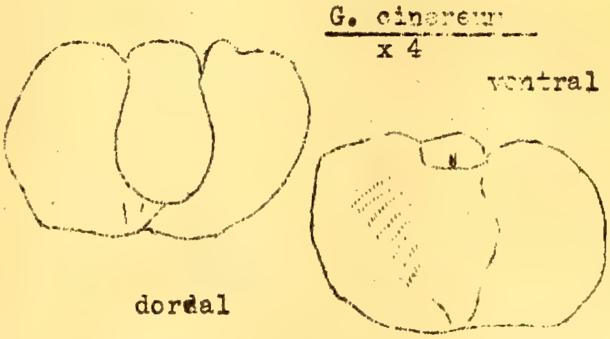
The description of this species is given by Oldroyd, p. 46 except for the following notes-

1. " Skidegate inlet, Queen Charlotte Islands, British Columbia, July,1910, W. Spreadborough, collector. Victoria Memorial Museum, Mollusks, no. 3177; cotype, presented to U.S. National Museum.
2. West side of Vancouver Island, Ucluelet, British Columbia at low tide, C.H. Young and W. Spreadborough, May,1919. Cotype, Victoria Mem. Mus. Ottawa, Cat. Mollusks, no. 3176. (Fig.4), drawn from alcoholic specimen.. The lack of lateral symmetry is probably due to contraction in the preservative.."

Below are tracings of the original figure (Zool. Jahrb. 1893, pl.16, fig.28; pl.17, figs. 10-26), figs. 12 and 13 being the only ones of the shell. Note magnification (x 55).



G. pacificum



G. cinereum
x 4

Family AGLAJIDAE

Genus Aglaja as spelled by most authors and in almost general use. However, we areadvised by Dr. A. Myra Keen " Aglaia Renier,1804 seems to be the original spelling, fide Sherborn. Therefore we will spell it,

Genus Aglaia Renier,1804. Type Doridium membranaceum Meckel.

The shell of this entire family is wholly internal and generally of a minute spire with a single whorl; sometimes membraneous, sometimes partly calcified.

Aglaia purpurea Bergh,1894. Catalina Island, Calif.
Aglaia diomedia Bergh,1894. Shumagin and Kodiak Islands, Alaska.
Aglaia ocelligera Bergh,1894. Sitka Harbor, Alaska.
Aglaia adellae Dall,1894. Eagle Harbor, Puget Sound in 20 fms.

Collecting data: In the course of our dredging operations we picked up a considerable number of these animals. They are no doubt at this time in preservative in the Hancock Foundation waiting for some one to classify them. We knew that we dredged several different species but no one of our acquaintance was interested in them and neither were we. (Burch).

Genus Navanax Pilsbry,1895. Type Navanax inermis(Cooper).
" Body elongated, similar in general character to Aglaja, but anterior angles of head-shield produced to form involute rhinophores. Shell as in Aglaja." (Pilsbry).

Navanax inermis (Cooper),1862. Elkhorn Slough,Monterey Co., Calif. (Mac Ginitie) to Estero, Ensenada,Mexico (Burch). Type locality, San Diego Bay.
Collecting data: This is our common California striped slug found in all bays and sloughs. It is really a beautiful animal. It is seasonably very abundant. We have seen them literally by the thousands in the slough at Mugu, Ventura Co., Calif. and all as full of Haminoea as they could be and not burst. They do have a very thin membraneous shell but it is a safe wager that you will carve up a lot of them before you find it unless you know ehere to look. (Burch).

Family TETHYIDAE

The family name APLYSIIDAE has been in general use by most authors. However, we are advised by Dr. A. Myra Keen (Per. Comm. April,1945) " Family TETHYIDAE is preferable. As Pilsbry shows (Proc. Acad. Nat. Sci. Philadelphia, vol. 47,1895, pp. 347-350). Aplysia Linnaeus,1767, is at most only subgenerically distinct from Tethys Linnaeus,1758. The genotype of Tethys, fide Pilsbry, is T. leporina Linnaeus."

Genus Tethys Linnaeus,1758.
" Shell very thin,membranous with a thin calcareous inner layer,nearly as large as mantle, concave, with pointed, small apex, bearing a recurved lamina, and having a concave posterior sinus." (Tryon & Pilsbry, Man. Conch.

Subgenus Neaplysia Cooper,1863. Proc. Calif. Acad. Sci. vol.3,Sept. 1863, p. 57.
" Form and external appearance as usual in the genus. Length fifteen inches, breadth five, height about the same. Color pale gray or greenish, becoming purplish at the side, folds of mantle with scattered white specks, from which an irregular network of brown lines extends over the rest of the body, interspaced with large brown blotches. Inner surface of mantle varied with alternating painted bars of white and dark brown interlocking together. Sole of foot black. Eyes very minute and black.

Shell contained in the substance of the mantle, cartilaginous, trans-lucent, trapezoidal or hatchet-shaped, margins rounded, slightly convex above,the nucleus or center in old specimens distant from the posterior end or apex. Faint radiating lines diverging from the nucleus, crossed by an irregular network of darker lines, all ending abruptly at some distance from the margin, which has thus a wide, nearly transparent border. An acces-sory plate arises on the inner surface from the nucleus, spatulate in form and slightly raised.

The two younger specimens have the clear border and accessory plate

less developed, and very young ones do not probably show these characters at all, but resemble the typical *Aplysia* in the form of the shell. On this general account I am unwilling to constitute it a new genus, but propose to call it a subgenus and the name of *Neaplysia*." (Cooper).

Tethys californica Cooper,1863. Monterey, Calif. to Punta Banda,Todos Santos Bay, Mexico (Burch). Type locality, San Pedro, Calif.

Collecting data: This is our common ' Sea Hare'. It frequents rocky shores . The shell may be removed from these rather easily. It is merely a thin corneous plate. It is seasonably abundant in such localities as Point Firmin,Palos Verdes, Balboa, Laguna Beach etc. (Burch); shore to 5 fathoms on kelp off Monterey, Calif. (A.G. Smith); Elkhorn Slough, Monterey Co. (MacGinitie); San Pedro and Morro Bay (H.N. Lowe).

It is likely that there will untimately be a number of subspecies described. In Nautilus 21, p.34,1907, Dr. S.S. Berry mentions a new variety but does not name it. It came from 12 fathoms off Monterey. In Nautilus 29:84 T.D.A. Cockerell discusses a species.

Tethys ritteri Cockerell,1901. San Pedro to La Jolla, Calif.

The La Jolla extension is based on Professor Cockerell's article in Nautilus 29. There may be two or more species around San Pedro but it requires careful studyand perhaps dissection to distinguish them. The only record we have other than the origihal references is that of H.N. Lowe who lists it from San Pedro.

Family TYLODINIDAE

Genus *Tylodina* Rafinesque,1819. Dr. A. Myra Keen advises (Per. Comm. April,1945) " The type of *Tylodina* is *T. punctulata* Rafinesque,1819 by monotypy. This is thought to be the same as the usually cited type *T. citrina* Joannia,1834."

This genus is placed under family UMBRACULIDAE by many authors. "Shell limpet like,depressed,apex-subcentral,with a minute spiral nucleus."

Tylodina fungina Gabb,1865. San Luis Obispo Co., Calif. (Burch) to Todos Santos Bay, Lower California (Chace). Type locality, Santa Barbara Island, Calif.

Collecting data: This species is only found in our experience associa--ted with a certain type of reddish yellow sponge. The extension of the range northward to San Luis Obispo Co. is interesting because I found these specimens of *Tylodina* on the typical sponge but the sponge was growing on the back of a large *Haliotis rufescens* Swainson brought into the market at Morro Bay. The divers told me that they had taken the Haliotis up north of Cayucos. We have taken the species along the Palos Verdes, Los Angeles County, and at Laguna Beach. (Burch); Mr. a nd Mrs. E.P. Chace took it at Punta Banda, Todos Santos Bay, Lower Calif., Mexico which is an extension of range in the other direction. Other records: Point Loma, San Diego Co . (Dr. Fred Baker); Laguna Beach (H.N. Lowe); La Jolla (Wilson & Fork)

Family PLEUROBRANCHIDAE

Genus *Pleurobranchus* Cuvier,1804. Type (by monotypy),*P. peronii* Cuvier The generic descriptions are largely devoted to a detailed observation of the characters of the animal. The shell is internal, haliotiform, with a posterior subspiral nucleus.

Pleurobranchus californicus Dall,1900. Crescent City, Calif. (Chace) to San Diego, Calif. Type locality, San Pedro, Calif.

We had an interesting affair with this genus in our Minutes #37, p.17

in which we figure and describe some shells taken by Mr.and Mrs. E.P. Chace from Crescent City, Calif. We gave it the name chacei , but Dr. F.M. MacFarland wrote an opinion for us which is to be found in our Minutes #39, p.29 advising us that the Chace shells are in his opinion californica. In any event this is a vast entension of range from San Pedro the former northern limit. Dr. MacFarland advised that he will shortly publish a description of another species of this genus from our fauna.

Pleurobranchus digueti Rochebrune,1895. San Pedro, Calif. to the Gulf of California (Dall). Type locality, Mogote, baie de la Paz.

Dr. Dall was evidently confused about this species because in Bulletin 112 on p. 65 he gives it as above under Pleurobranchus, but on p. 166 under Lamellaria digueti Rochebrune etc. he gives the same reference to page and figure.

Dr. F.M. MacFarland states " P. diguetu appears in many lists from southern California. I have studied it in detail in specimens from the Gulf of California, but have no reliable records from more northern points."

However, we have the following statement from Mr. A.M. Strong (Per. Comm. April,1945) " Captain White and I collected a dozen or more specimens of what I believe to be Pleurobranchus digueti Rochebrune from White's Point, near San Pedro. The shell is quite different from that collected at Crescent City by the Chaces."

Order NUDIBRANCHIATA

A discussion of the species and groups under this order will be omitted pending the publication of a monograph by Dr. F.M. MacFarland.

Order PULMONATA

Family ELLOBIIDAE

Genus Phytia Gray,1821. Dr. A. Myra Keen advises us on this genus as follows (Per. Comm. April,1945) " The type of Phytia Gray,1821 is Voluta denticulata Montagu, by monotypy. Some authors use the generic name Alexia Gray,1847, apparently because of Sherborn's statement that Phytia is an error for Pythia. However, there is no evidence for the latter interpretation in the original paper of Gray, which I have examined carefully. Anyway, Alexia is preoccupied. In Britain two subspecies of Phytias are recognized. The marine form is called Phytia myosotis denticulata (Montagu) 1803, and the brackish water form is P. myosotis myosotis (Draparnaud),1801."

" Shell oblong-oval, thin, spire acuminate; last whorl large,rounded at base; columella with an oblique plait; aperture contracted by teeth, and sometimes by a callosity of the outer lip." (Tryon & Pilsbry, Man. Conch .)

In the way of some of the discussion in regard to the generic name the following note from A.G. Smith is of interest " I have nothing to offer on Phytia vs. Alexia , except to complicate the situation by calling attention to the fact that Hans Schlesch of Copenhagen uses the genus Myosotella Monterosato,1906 (Revidiertes Verzeichnis der danischen Land -und Susswasser-mollusken mit ihrer Verbreitung- Archiv fur Molluskenkunde,66, 1934, Seite 280).

Phytia setifer Cooper,1872. Puget Sound to Terminal Island, Calif. Type locality, Mission Creek, San Francisco.

The question of whether the above specific name is valid or in the synonymy of P. myosotis Drap. has been a matter of debate with local collectors. Dr. G. Dallas Hanna in Bulletin, Dept. of Sgric., State of Calif., vol.28, no.5, p. 308, May,1939 discusses the problem in his paper on "Exotic Mollusca in California". Dr. Hanna figures the species on Plate F, fig.2 and is evidently of the opinion that setifer is conspecific with myosotis .

Dr. W.O. Gregg of our club is making a study of this problem and will no doubt report his findings shortly.

Collecting data: My only experience and the only locality I knew for this species is exactly where the huge Cal Ship ways are today on Terminal Island. However, the species was so exceedingly abundant that it is doubtful if it could have been killed out. It could be found so far from the water on the flats that it seemed more like a land shell. The easiest way to get all you could ever use in a minute or so was to take a wist broom and pick up any old board or stone and brush them off. The only difficulty then was that you would find a nice job separating the thousands of young *Phytia* and the *Syncera translucens* Carpenter. (Burch); Elkhorn Slough, under *Salicornia* , abundant (Hanna); " I am using Cooper's name until we can be certain that *setifer* is conspecific with *myosotis*, based on a comparison of West Coast specimens with those from Europe. I have a suspicion that this shell is an introduced species on the evidence that it has been reported so far only from ports frequently visited by sailing ships in the early days." (A.G. Smith); Clallam Bay, Clallam Co., Wash., Coupeville, Whidley Island, Island Co., Wash., Manitou Beach, Kitsap Co., Wash. (W.J. Eyerdam); Humboldt Bay (Kelsey); Humboldt Bay (Chace); San Francisco (Orcutt); Newark Creek, Alameda Co.,Calif. (Dr. Greig); San Pedro (Chace)

Phytia reflexilabris (d'Orbigny),1840. Ecador to Chile.

Genus Pedipes Scopoli,1777. Type, Pedipes afer Gmelin. (fide Oldroyd)
" Shell imperforate, oval-subglobose, solid, spirally striate,whorls few, the last very large; aperture much contracted by teeth; columellar lip with usually three dentiform plications, of which the posterior one is largest and spiral; outer lip sharp, callous or dentate within."

Pedipes unisculatus Cooper,1866. Malaga Cove, Santa Monica Bay,Calif. (Burch) to Gulf of California. Type locality, San Pedro, Calif.

Collecting data: Our experience has been to find this species on all occasions in about the same habitat. An example of this is the rocky rubble below the Palos Verdes Club House. To find this species in greatest abundance climb up at least ten feet above the high tide line to a position reached only by spray. Then it is necessary to dig a hole in the rocky rubble. At a depth of 1 to 2 feet you will find Pedipes in great numbers and associated with Truncatella stimpsoni Stearns. An accompanying condition of the habitat seems to be that the rocks be packed with dead eel grass and algae. It might be mentioned that this habitat is a favorite of several other species including Fartulum orcutti Dall which may be found on careful examination in vast numbers on and in the algae and eel grass. As I recall it took me several hours to collect a large cigar box full of each of the above species which is ample to give a large set to probably every shell collector on earth. Collecting date 8/28/36 (Burch). . Also taken below La Jolla, Calif. 5/1936; and Punta Banda, Lower Calif. Mexico 12/1937. The collecting dates indicate that the habitat of these species is not seasonal but they are there the year around.(Burch). Pacific Beach (Kelseyand Stephens); Santo Domingo, Lower Calif. (Orcutt); San Diego (Gripp and Hemphill); La Jolla (H.N. Lowe).

Pedipes liratus Binney,1860. San Diego, Calif. to Gulf of California. Type locality, Cape San Lucas, Lower Calif., Mexico.

Collecting data: Punta Banda, Todos Santos Bay, Lower Calif. (Chace); San Diego, Calif. (H.N. Lowe).

Pedipes angulatus C.B. Adams,1852. (Panama) Albemarle Id.,Galapagos.

This species is not of our fauna but seems to be the only other species described from this coast.

Genus Melampus Montfort,1810. Type (by original desig.), Bulimus coniformis Bruguiere ** Bulla coffea Linnaeus. (fide Grant & Gale, p 461).
" Shell ovate-conic; spire low; aperture somewhat elongate, gently rounded below; inner lip polished, but not incrusted, bearing plications; outer lip generally thin, simple, sometimes bearing within lirations or a row of denticulations; umbilicus closed or a mere chink; no developed anterior canal not posterior notch; sculpture absent or reduced to growth lines. Size generally small, averaging for genus about 12 or 15 mm."

Melampus olivaceus Carpenter,1857. Monterey Bay (Salinas River), Calif. to Mazatlan, Mexico (Dall). Type locality, Mazatlan, Mexico.

There seems to be a question about the northern limit of the range as stated by Mr. A.G. Smith as follows " Reported from the mouth of the Salinas River by Dall, although no one has reported it from the Monterey region since. This record needs confirming."

Collecting data: This species is usually labelled as having been collected in bays, sloughs, lagoons etc., but this is not strictly accurate because the habitat is up on the mud flats, and as a rule consider-

-ably higher even than the favorite condition for Cerithidea. A typical situation where this species may be taken in any quantity required is the salt marsh in back of Anaheim Bay. It is interesting that they apparently crawl up the stalks of the salt weed growing up almost along the side of the highway. I have picked them off the vegetation in places that reminded me a great deal more of collecting land shells then marine species. It is a very common species in such habitats on Terminal Island, Mission Bay, San Diego Bay (very abundant on the inner bank of the strand), and all around the upper banks of the Estero below Ensenada, Mexico.(Burch); Kino Bay, Sonora; San Jose Island, Gulf of Calif. (H.N. Lowe); Ocean Beach, Calif. (Bristol); Newport, Calif. (Stephens); Alamitos Bay (Lowe) San Diego Bay (W.K. Emerson).

While the above species is the only Melampus described from our fauna there are a number from this coast in the southern fauna. The list follows:

Melampus tabogensis (C.B. Adams),1852 Magdalena Bay to Panama
" pyriformis (Petit),1842. Panama to Peru
" trilineatus (C.B. Adams),1852. Panama
" panamensis (C.B. Adams),1852. Panama
" infrequens (C.B. Adams),1852 Panama
" concinnus (C.B. Adams),1852. Panama
" bridgesii Carpenter,1856. Panama
" luteus Q. & G.,1832 Ecuador to Peru, Guam etc.
" globulus Ferussac,1835 Ecuador
" acromelus (Troschel),1852. Peru
" olivulus Beck. Guayaquil, Brazil etc.

While there are a number of species involved that are of the southern fauna the following key from the notebook of Mr. A.M. Strong should be of interest.

Family ELLOBIIDAE

Aperture long and narrow, spire blunt
. Columellar plait rather oblique, body smooth or plaites ....Melampus
.. Outer lip with internal parallel plaits
... Body with 1 plait
.... Columellarplait small, oblique
..... Greenish with indistinct whitish markings .... olivula
11 x 7½ mm Brazil and Ecuador Pfeiffer Cat. p. 16
.... Columellar plait large and lamelliform
..... Shining fulvous, with narrow chestnut bands ...... globulus
10 x 6 mm Ecuador Reeve Auricula 7-60
... Body with 3 plaits
.... Uniformly blackish chestnut colored .... tabogensis
13 x 8 mm Magdalena Bay to Panama Panama Shells #314
... Body with 3 plaits
.... Columellar plait nearly horizontal
..... Uniformly yellowish, solid, nearly smooth .... luteus
18 x 10½ mm Panama to Peru,Guam etc. Reeve Auricula 3-19
.... Columellar plait descending obliquely to the margin
.....Purplish with irregular brown tessellations .... olivaceus
16 x 9½ mm Monterey to Gulf of Calif. Oldroyd 2-1, p. 54
..... Flesh colored, with 4 brown bands .... acromelea
12 x 7 mm Peru Pfeiffer cat. p. 27
... Body with more than 3 plaits

.... Dark brownish red, with 3 white spiral lines..... trilineatus
18 x 11 mm Panama. Panama Shells # 315
.. Outer lip with indistinct plaits
... Olivaceus brownish, with yellow spots and streaks .. pyriformis
13½ x 8 mm Panama to Peru Reeve Auricula 7-60
.. Outer lip with a single internal rib
... Blackish brown, shining .... panamensis
11 x 5 mm Panama. Panama Shells # 312
.. Outer lip without plaits
... Body with 1 plait
.... Brown, an indistinct pale band near the suture ..... infrequens
6 x 4 mm Panama. Panama Shells # 311
... Body with 2 plaits
.... Blackish brown, with a yellowish spiral band .... concinnus
8 x 5 mm Panama. Panama Shells # 310
... Body without plaits
.... Blackish brown, shining .... bridgessi
9 x 3 mm Panama. P.Z.S. 1906, p. 161
Aperture long and narrow, spire blunt, continued
. Columellar plait perpendicular, body with 1 or 2 plaits .. Auricula
.. Columellar plait prominent, twisted
... Upper plait nodiform, middle one oblique
.... Surface with minute papillae, epidermis yellowish ... stagnalis
25 x 10 mm Panama to Ecuador. Reeve Auricula 2-3
... Upper plait indistinct, middle one horizontal
.... Brownish, slightly shining .... frumentum
6½ x 3 mm Peru. Reeve Auricula 4-22
.. Columellar plait callus, dentiform
... Yellowish fulvous, with irregular striae of growth ...... avena
6½ x 3½ mm Chile. Reeve Auricula 4-24
.. Columella with 2 plaits
... Pale, slightly striated .... pallidus (?)
2 x 1 mm Colombia Pfeiffer Cat. p. 103
Aperture semi-ovate to ovate, spire conical
. Columella with 2 plaits, body with 1 .... Pedipes
.. Whorls rounded
...Spiral sculpture of 1 strong & 3 shallow grooves ...... unisculptus
8 x 5 mm San Pedro to Gulf of Calif. Oldroyd 2-1, p. 53
... Spiral sculpture of regular raised threads .... liratus
3½ x 2½ mm Panama Oldroyd 2-1, p. 54
.. Whorls slightly angular, excavated above the angle
... Spiral sculpture of unequal ridges .... angulatus
7½ x 5 mm Panama Panama Shells # 308
. Columella with 1 plait, body with 1 to 5 tuberculate plaits.. Phytia
.. Body with a strong plait, above which are 2 smaller
... Pale to dark purplish brown .... setifer
10 to 3 mm Puget Sound to San Pedro Oldroyd 2-1, p. 53
.. Body with a single compressed plait
... Dark chestnut colored, shining .... reflexilabris
9 x 4 mm Ecuador to Chile Pfeiffer Cat. p. 115
. Columella with 1 plait, body with 2 converging plaits ... Marinula
.. Surface slightly striated, shell solid
... Fulvous, with irregular reddish brown streaks .... acuta
12½ x 5½ mm Panama to Ecuador Pfeiffer Cat. p. 45

.. Surface slightly wrinkled, an impressed line below suture
... Brownish green, scarcely shining .... pepita
14 x 7 mm Ecuador to Chile Pfeiffer Cat. p. 44
.. Surface wrinkled, opaque blackish, solid .... marinella
9 x 5 mm Peru to Chile and nigra Phil. m.s. Pfeiffer Cat. p.45

Some of the species in the above key follow:

Genus Auricula	
A. stagnalis d ' Orbigny,1835	Panama to Ecuador
A. pallida Sowerby	West Colombia
A. frumenta (Petit),1842	Peru
A. avena (Petit),1842	Chile
Genus Marinula	
M. acuta d'Orbigny,1835	Panama to Ecuador
M. marinella Kuster,1884.	Peru
M. pepita King,1831	Ecuador
Genus Detracia	
D. zeteki Pilsbry	Panama

Family TRIMUSCULIDAE (GADINIIDAE)

Genus Trimusculus Schmidt,1818. Type (by subsequent designation Rehder, 1940), Trimusculus mamillaris Linnaeus (Patella mamillaris L.)

* Note* Rehder, Harald A., " On the Molluscan Genus Trimusculus Schmidt"1818 with notes on Some Mediterranean and West African Siphonarias", Proc. Biol. Soc. Wash., vol. 53,pp 67-70, June 28,1940.

We are following Dr. Rehder on this genus which will place the following in the synonymy : Gadinia Gray,1824; Clypeus Scacchi,1833; Mouretia Sowerby,1835; Rowellia 'Cooper' Carpenter,1864.

" Shell low, conical or dome shaped; apex blunt, central or subcentral; sculpture radial or irregular; interior simple, without septum, an arcuate muscle scar above the margin. Animal an air breather, with a lung and without gills."

Trimusculus reticulatus (Sowerby),1835. Trinidad and Farallone Islands to Cape San Lucas (Dall).

Collecting data: The habitat is about high tide line on rocky shores . It is not really common although when found they are usually in colonies and one find is enough. Monterey, Playa del Rey, Santa Monica (breakwater), Palos Verdes, Point Firmin, El Morro Pt. N. of Ensenada,Mexico, La Jolla, Balboa, Calif. (Burch); Scarce at low tide under rocks. Large colonies on the roofs of caves exposed at low tide between Point Pinos and Point Lobos, where they are sometimes stained gray or pinkish by a species of coralline (A.G. Smith); rare, rocks at Silver Strand, Bird Rock, La Jolla (W.K. Emerson); San Martin Id., L.C. (Dr. F. Baker); So. Island Los Coronados in 3 to 8 fms. (Dr. F. Baker); San Diego and Pacific Beach (Kelsey); La Jolla (Bristol); San Geronimo Bay, L.C. (Lowe); San Clemente Island, San Nicolas Island, White's Point (Lowe).

Trimusculus peruvianus (Sowerby),1835.
Gadinia peruviana (Sowerby),1836. Gulf of California to Chile.

Not reported from California but seems to be the only other species described from this coast.

Family SIPHONARIIDAE

Genus Siphonaria Sowerby,1823. S. sipho Sowerby,1823 is type by original designation. Dr. A. Myra Keen advises that the date is 1823 (not 1824) as usually listed by authors.

" Shell solid, porcellanous, with subcebtral apex and radial sculpture; inner lateral teeth of the radula bifid, outer trifid." (Dall)

Subgenus Liriola Dall,1870. Type (by orig. desig.) S. thersites Carpenter. " Shell thin, horny, with apex eccentric; smooth or faintly radially striate. Habitat, cooler or temperate seas." (Dall).

Siphonaria thersites Carpenter,1864. Aleutian Islands to Strait of Fuca Type locality, Neah Bay, Washington.

Collecting data: Sitka, Ketchikan, Forrester Island, Alaska (G. Willett); on Fucus and under stones near high tide mark, Drier Bay, Mallard Bay and Thum Bay, Knight Island, Izhut Bay and Red Fox Bay, Afognak Id., Sitkalidak Id., Three Saints Bay, Kodiak Id., Shumagin Ids., Mitrofania Id., and Unalaska Id. (W.J. Eyerdam); Sitka, Alaska (H.N. Lowe); Prince of Wales Island (J. Henderson);

Subgenus Kerguelenia Rochebrune and Mabille,1889. Dr. Dall and others placed our species S. brannani in this subgenus. Thiele considers it to be a synonym of Liriola. For the interest of those who may study the group the original description follows:

" Testa capuliformi, ovato-elongata, convexa; vertice postico ad marginem incumbente, versus sinistram oblique torto.

Coquille capuliforme, ovale-allongee, convexe, a' sonnuet posterieur, incline' sur la marge, que, dans certains cas,il atteint, et un peu obliquement repete sur la gauche.

Ce nouveau geure, que nous formous aux depens des especes du geure Siphonaria, differe de ce deruier par les caracteres suivants: une forme generale, tres differente: le sonnuet completment posterieur; le test nuiee, fragile, a' peiue costule, simplement strie; le sillon mediocrement marque a' l' interieur, a' peiue sensible a' l'exterieur, partant de sonnuet pour venir aboutir sur ou pres du lord anterieur, par consequent plus ou mouis parallele ou oblique a' la ligne mediane de la coquille, au lieu de lui etre presque perpendiculaire."

Siphonaria brannani Stearns, 1872. Malaga Cove, Los Angeles Co. (Willett) to Acapulco, Mexico (Dr. F. Baker). Santa Barbara and Santa Catalina Islands (Dall). to Paetilla Point,Panama (Baker).

Collecting data: Malaga Cove, Los Angeles Co. in 15 fms. (G. Willett); dredged off Redondo Beach, Calif. in 15 to 25 fms. gravel bottom (Burch); Acapulco, Mexico, Magdalena Bay, and San Diego, Calif. (Dr. Fred Baker); Mazatlan, Mexico and Manzanillo (Orcutt); Laguna Beach, Calif. and Cape San Lucas, Mexico (H.N. Lowe).

Genus Williamia Monterosato,1884. Type (by monotypy) Ancylus ? gussonii da Costa (fide Woodring).

The following is an interesting note by Mr. A.M. Strong on this genus (Per. Comm. April,1945) " I believe that Williamia vernalis Dall is a good variety of Williamia peltoides living under quite different conditions. I have specimens collected at Magdalena Bay by Orcutt and labelled Williamia galapagana Dall and I suppose identified by him. They seem to at least be very similar to our Southern California dredged specimens. They appear to have been collected in beach drift and so there is no indic-

-ation of where they lived. The type of Williamia galapagana Dall and a good many specimens are in the Academy of Sciences at San Francisco. They were collected both in drift on shore and living attached to floating sea weed. They are very similar to our dredged shells but seem to live under different conditions. The description is in Proc. Calif. Acad. of Sciences 4th ser. vol. 11, pt. 1, 1917, p. 332. This is a paper on land shells"

Williamia peltoides (Carpenter),1864. Monterey to Gulf of California. Type locality, Cape San Lucas, Mexico.

Grant and Gale, 1931, p. 463 place the following species W. vernalis in the synonymy of this species. It is true that the two forms are very close but in our experience the two forms are not taken together which would indicate that they are at least subspecifically distinct.

The manner in which certain animals with lungs are able to extract axygen from the water has been explained by several authors. This genus is somewhat amazing though for an air breather. It is exceedingly abundant in the gravel off Redondo Beach in 25 fathoms, and we have nrought up living specimens from over 75 fathoms off Redondo Beach associated with definitely deep water fauna.

Collecting data: Dredged off Monterey on the shale in 10 fms. and 20 fms., off Pacific Grove in 15 fms., Redondo Beach 25 to 75 fms., (Burch) 18 fms. off S. Coronado Island (Dr. F. Baker); Monterey,Pacific Grove etc. beach drift and 10-12 fathoms on rocks, living, a rare species (A.G. Smith); San Martin Island, L.C. (Dr. F. Baker); La Jolla (Orcutt); San Diego (Hemphill); Catalina Island in 30 fathoms, and San Pedro (Lowe).

Williamia vernalis(Dall)1870. Crescent City, Calif. to Gulf of Calif. Type locality, Monterey, Calif.

Collecting data: San Onofre,Cayucos,La Jolla, Calif. littoral;Punta Banda, Lower Calif. littoral on stones in the rubble reef; dredged off Redondo Beach in 25 fms., Avalon, Catalina Island in 35 fms., Malaga Cove, Los Angeles Co. in 15 fms.; Monterey, in 10 fms. (Burch); Monterey from low tide to 12 fms. on rocks and shale fragments, fairly common (A. G. Smith); Carmen Island, Gulf of California (H.N. Lowe); Cayucos,Calif. (Lowe and Caruthers); San Onofre, Calif. and San Nicolas Island,Mexico (H.N. Lowe); Magdalena Bay, L.C. (G. Willett).

Williamia galapagana Dall,1909. Magdalena Bay to Panama.
Not of our fauna but mentioned above.

Other species of the genus Siphonaria described from the southern fauna of this coast follow:

Siphonaria maura Sowerby,1835. Magdalena Bay to Ecuador
  var. lecania Philippi,1846 Magdalena Bay (Orcutt).
  var. palmata Carpenter,1857. Tres Marias Islands
  var. aequilirata Carpenter,1857.
Siphonaria gigas Sowerby,1825. Gulf of California to Peru.
Siphonaria scutella Deshayes Galapagos
Siphonaria lineolata Sowerby,1835. Nicaragua. Ecuadot to Chile.
Siphonaria lessoni Blainville,1824. Peru to Magellan Straits.
Siphonaria (Kerguelenia) costata Sowerby,1835. Central Amer. to Chile
Siphonaria (Kerguelenia) tenuis Philippi,1860. Peru to Chile.

Family ONCHIDIIDAE

Genus Arctonchis Dall,1905. Type (by original designation) Onchid-ella borealis Dall. Harriman Alaska Expedition, vol. 13,1905, p. 112.

" Species small like Onchidella, but without muciparous glands on the lower side of the mantle, without dorsal eyes and with a jaw. Cool temperate and boreal coasts." (Dall).

This was described by Dr. Dall as a Section of Subgenus Onchidella under Genus Onchidium.

Arctonchis borealis (Dall), 1871. Port Moller and Aleutian Islands to Northern California. Type locality, Sitka, Alaska, on rocks near tide marks, especially on the small islets in the Bay".

The types are in the California Academy of Science, sealed in alcohol . Two additional sets collected by Hemphill from Coos Bay, Oregon also sealed in alcohol in the Hemphill collection of alcoholics in the C.A.S.

Mr. A.G. Smith sent the above information and also the following note " I think I have already mentioned the specimens of this in the Academy collection taken by Hemphill at Coos Bay and Fort Bragg. They look like small rough black limpets without shells and are apparently found on the rocks between tides. I have not found it on the Mendocino Coast mainly, I guess, as I didn't know what it was until recently and therefore could have easily overlooked it."

This group seems to be the reverse of some we have studied in that they seem to be land animals apparently returning to the sea. There are other species omitted from Bulletin 112 by Dr. Dall and also by other faunal lists. No doubt this has been done on the assumption that they are land animals and perhaps they are. In fact it is questionable if the above species is properly placed in a list of the marine fauna. However, Dr. Dall discusses the following species in the same article in which he described A. borealis and in the interest of completeness we will give the limited data we have below.

Genus Onchidella Gray,1850. Type (by Sub. Desig. Herrmannsen,1852) Onchidium nigricans Quoy. (fide Dall,1905).

" Dorsal surface without arborescent processes, margin of the mantle with prominent spaces papillae, serving as conduits for mucous glands; lower surface of the mantle with muciparous glands; dorsum with dorsal eyes; mouth agnathous. Warmer seas." (Dall)

Onchidella carpenteri W.C. Binney,1869. California and Puget Sound. Binney and Bland, Land and Fresh Water Shells,1869, p. 307; W.G. Binney, Manual of American Land Shells, U.S.N.M. Bull.28, 1885, p. 183; Dall, Harriman Alaska Expedition,vol.13,1905, pp. 113,114.

Dr. W.O. Gregg advises that being agnathous this species is certainly in a different genus than Arctonchis borealis.

Family TEREBRIDAE

Genus *Terebra* Bruguiere,1789. Type (by monotypy, Lamarck,1799), *Buccinum subulatum* Linnaeus. (fide Grant and Gale,1931, p.464).

Subgenus *Terebra* s.s.

" Shell of large or moderate size, heavy; sculpture generally rather low or absent; columella twisted, often with one or two folds" (Grant & Gale,1931, p. 464). Not represented in the California fauna.

Subgenus *Strioterebrum* Sacco,1891. Type (by original designation), *Terebra basteroti* Nyst. (fide Grant and Gale, p. 466).

" Shell small or medium sized, slender; whorls sculptured with axial ribs and spiral threads or grooves, sutural band generally well defined; aperture rather narrow, anterior canal short, notched, columella generally with a broad basal fold" (Grant and Gale).

Terebra pedroana Dall,1908. Redondo Beach, Calif. (Burch) to Scammon's Lagoon, L.C. (Keen,1937) (lat. 27). Type locality, San Pedro, Calif. (fide Oldroyd, p. 60).

Grant and Gale,1931, p. 469 make this species and the variety *philippiana*, which they place in the synonymy of typical *pedroana* , subspecies of *T. albocincta* Carpenter,1857. Grant and Gale may be correct about this.

In the first place the nomenclature of the species is in question and we will no doubt soon have some corrections to make. Mr. A.G. Smith advises " Dr. Hanna has a paper in mss. in which he says that both of Dall's names are preoccupied."

Returning to the matter of *pedroana* vs. *philippiana* . The variety *philippiana* is supposed to be distinguishable from typical *pedroana* by its less distinctly developed axial ribs. However, the situation in most collections may be explained by an account of the discussion at the last meeting of the club. Mr. George Willett passed around a large box containing several hundred specimens with the comment " Both forms are there. Separate them if you can." The consensus of opinion seems to be that they are one species and that intergrades are too abundant for *philippiana* to even be considered a valid variety. Habitat may alter the form to some extent. Another comment by Mr. George Willett is of interest " A set in my collection collected by Connely at San Quentin Bay, labelled *T. variegata* Gray, looks much like the few beach specimens I have of T. Pedroana." *Terebra pedroana philippiana* Dall,1920 will therefore be placed in the synonymy. Dr. Dall gave it the range " Santa Barbara to head of the Gulf of California" which would change the range of the typical northward to Santa Barbara. Dr. A. Myra Keen advises " According to the label on the holotype of *Terebra pedroana philippiana* Dall, the type locality is San Pedro. The holotype is U.S. Nat. Mus. no. 4943."

Collecting data: Dredged off Malaga Cove, L.A. Co. in 15 fms. and off Redondo Beach, Calif. and San Pedro in 5 to 15 fathoms, off Santa Monica in 7 fms., littoral on Terminal Island, Bird Rock, San Diego Co., San Onofre, dredged in 15 fms. off Ensenada, Mexico (Burch); off Newport Bay in 30 fms. (G. Willett); San Diego Bay (W.K. Emerson); Blanco Bay, L.C. (Cabrali); mission Bay (Baker and H.N. Lowe); Ocean Beach (Baker); The following labelled with the varietal name *philippiana* : Santo Domingo, L. C. (Orcutt); Magdalena Bay (Anderson); San Ignacio Lagoon (Hemphill); San Pedro, Calif. (Oldroyd, H.N. Lowe and Tremper); Acapulco (Dr. F. Baker). Obviously this record from Acapulco,Mexico by Dr. Baker should be checked. The specimens are in the collection of the San Diego Museum of Natural History.

The following list of species of the genus Terebra covering the entire west coast will be of interest to some of the members. This is taken from Mr. A.M. Strong's notebook.

Genus Terebra Bruguiere,1789.
Terebra robusta Hinds,1844. (San Blas to Panama)
" var. lingualis Hinds,1844 Panama. Near Mazatlan.
Terebra strigata Sowerby,1825. (Panama and Galapagos).
Terebra pedroana Dall,1908. (Santa Monica to Gulf of Calif.
var. philippiana Dall,1920.
Terebra albocincta Carpenter,1857. (Gulf of California).
var. hindsii Carpenter,1857.
var. rufocinerea Carpenter,1857.
var. subnodosa Carpenter,1857.
Terebra variegata Gray,1834. (Gulf of Calif. to Panama).
Terebra balaeonora Dall,1908. (Lower California).
Terebra lucana Dall,1908. (Cape San Lucas)
Terebra specillata Hinds,1844. (San Blas, Panama). (near Mazatlan)
Terebra tuberculosa Hinds,1844. (San Blas to Panama)
Terebra ligyrus Pilsbry & Lowe,1932. (Guaymas to Acapulco)
Terebra ira Pilsbry & Lowe,1932. (Mazatlan) (Gulf of California)
Terebra isopleura Pilsbry & Lowe,1932. (Mazatlan)
Terebra roperi Pilsbry & Lowe,1932. (Mazatlan)
Terebra malonei Vanatta. (Santa Rosalia)
Terebra alata Hinds,1844. (Central America).
Terebra varicosa Hinds,1844. (Central America)
Terebra radula Hinds,1844. (Central America)
Terebra brunneocincta Pilsbry & Lowe,1932. (Nicaragua) (near Mazatlan)
Terebra corintoensis Pilsbry & Lowe,1932. (Nicaragua) (Gulf. Calif.)(Panama
Terebra sanjuanensis Pilsbry & Lowe,1932. (Costa Rica)
Terebra armillata Hinds,1844. (Acapulco,Nicaragua to Panama,Gulf Calif.)
Terebra aspera Hinds,1843. (Acapulco, Panama to W. Colombia)
Terebra panamensis Dall,1908. (Acapulco, Panama).
Terebra bridgesi Dall,1908. (Panama)
Terebra paphia Bartsch (Acapulco)
Terebra cracilenta Li,1930. (Panama)
Terebra melia Pilsbry,1931. (Panama)
Terebra montijoensis Pilsbry & Lowe,1932. (Panama)
Terebra ornata Gray,1834. (Cape San Lucas) (Galapagos).
Terebra frigata Hinds,1844. (Galapagos)
Terebra larvaeformis Hinds,1843. (Ecuador)
Terebra gemmulata Kiener,1839. (Chile)
Terebra (Microtrypetes) iola Pils. & Lowe,1932 (Mazatlan)
Terebra (Microtrypetes) polypenus Pils. & Lowe,1932. (Mazatlan)
Terebra (Microtrypetes) mariato Pils. & Lowe,1932. (Panama).
Terebra (? Perirhoe) stylus Dall,1908. (Panama)
Terebra (?) guayaquilensis E.A. Smith,1880. (Ecuador)
Terebra (Subula) rooseveltii Bartsch,1939. (Socorro Island).
Terebra glauca Hinds,1844 (Panama)
Terebra luctuosa Hinds,1844 (Gulf of Calif.)
Terebra incomparabilis Desh.,1859. (Panama)
Terebra galapagensis Dall. (Albemarle Island).

The following key to species of the genus Terebra is taken from Mr. A.M. Strong's notebook.

Genus Terebra

Whorls with a sutural band set off by a groove .... Subgenus Strioterebrum.

Lower whorls smooth except for lines of growth
. Band wide, groove a little above the middle of the whorl
.. Yellowish white, with irregular vertical axial chestnut stripes
136 x 32 mm. Panama & Galapagos .... strigata
Reeve fig.5 Sowerby pl.61, fig.10. Tryon pl.2, f.29.

. Band narrow
.. Last whorl globose or bulbous
... Whitish with retractive axial chestnut flames forming two obscure spiral bands.
138 x 30 mm San Blas - Panama .... robusta
Reeve fig. 10 & 49. Sowerby pl.62, fig. 35. Tryon pl.2, f.16,17.

.... Sutural band doubly crenated .... variety lingualis
Reeve fig. 15 Sowerby pl.63, fig. 50

.. Last whorl short, base contracted
... Yellowish white, three spiral rows of chestnut spots
88 x 24 mm Galapagos .... ornata
Reeve fig. 14 Sowerby pl.62, fig. 34 Tryon pl.2, fig.28

Lower whorls with a spiral groove or cords
. Sutural band raised, more or less nodulose
.. Body whorl with a light peripheral band showing as a white line inside the aperture
... ~~Adult~~ shell stout and over 2 inches in length
....Sculptured with spiral grooves and lines of growth only or faint axial ribs.
..... White to bluish-gray, with reddish or brownish interrupted spots
72 x 16 mm Gulf of California .... variegata
Reeve fig. 12 Sowerby pl. 63, fig.52 Tryon pl. 2, fig. 15

.... Sculptured with spiral grooves and strong axial ribs
..... Brownish, obscurely banded and spotted
54 x 14 mm Panama to Galapagos .... armillata
Reeve fig. 12 Sowerby pl. 61, fig. 49. Tryon pl.2, figs. 21,23.

.... Sculpture nodulous, with spiral cords and axial ribs
..... Three spiral rows of tubercles
...... Pale orange to dark brown, variously maculated
54 x 15 mm Panama to W. Colombia .... aspera
Reeve fig. 40 Sowerby pl. 63, fig.44 Tryon pl.1, fig.7

..... Four spiral rows of tubercles
...... Reddish brown, faintly banded
40 x 11 mm Central America (loc. doubtful) ...... [illegible]
Reeve fig. 68 Sowerby pl.64, fig. 95 Tryon pl.7, fig.17

..... 3 to 5 spiral rows of tubercles
...... Of a general brownish tint
22 x 6 mm Panama (Probably young) .... panamensis
Bull. Mus. Comp. Zool. vol. 43, p. 250

... Adult shell slender, less than 2 inches in length
.... Spiral sculpture of incised grooves
..... Sutural band nodulous on early whorls only
...... Axial ribs low but distinct
.... Bluish white to yellowish brown, irregularly blotched
32 x 6.5 mm Southern California .... pedroana
Bull. Mus. Comp. Zool. vol. 43, p. 251

...... Axial ribs reduced to mere lines of growth
variety philippinarum
Ann. Mag. Nat. Hist. v. 15 p. 394 as M. simplex Carpenter.

..... Sutural band nodulous on all whorls
...... Spiral sculpture of 4-5 spiral grooves
.... Axial ribs distinct on early whorls only
.... Purplish brown to olivaceous, sutural band whitish
40 x 8.5 mm Gulf of California .... albocincta
Mazatlan Catalogue #450

.... Axial ribs obsolete, spiral grooves strong
.... Whitish, faintly spotted with reddish brown
31 x 7 mm Gulf of California .... hindsii (var.)
Mazatlan Catalogue # 451

.... Axial ribs strong, spiral grooves faint
.... Uniform reddish brown, sutural band pale
30 x 6 mm Gulf of California .... rufocinerea (var.)
Mazatlan Catalogue # 453

.... Surface faintly beaded
.... Whitish, tinted with red-brown
30 x 9 mm. Gulf of California .... subnodosa (var.)
Mazatlan Catalogue # 452

.... Axial ribs and spiral grooves distinct on all whorls
.... Reddish white, red banded at base
25 x 5 mm. Central America .... elata
Reeve fig. 128

.... Shining white (a doubtful species)
23 x 6 mm. Galapagos .... frigata
Reeve fig. 132 Sowerby pl. 64, fig. 71 Tryon pl.7, f.26

...... Spiral sculpture of about 6 grooves
.... Axial ribs distant (about 12 on body whorl)
.... Livid purple, whitish on ribs
10.5 x 2.5 mm Panama .... bridgesi
Bull. Mus. Comp. Zool. v.43, p. 253

[illegible] .....

[illegible] ......

[illegible] .....

[illegible] ......

[illegible] ......
[illegible] ......
[illegible] ....
[illegible] ....

[illegible] ....
[illegible] ....

[illegible] ....

[illegible] ....
[illegible] ....

[illegible] ....

[illegible] .....

[illegible] ....

[illegible] ....

.. Periphery and inside of aperture without color band
... Axial ribs strong on all whorls
.... Spiral sculpture of incised grooves
..... Axial ribs only slightly waved
...... Whitish, blotches of flesh color
44 x 9 mm. San Blas .... specillata
Reeve f. 75 Sowerby pl. 65, fig. 116 Tryon pl.7, f. 18

..... Axial ribs strongly curved
...... Pinkish white to rich brown, unicolor
58 x 12 mm Santa Elena,Ecuador .... larvaeformis
Reeve f. 41, Sowerby pl. 63, figs. 46,46 Tryon pl.45,66

.... Spiral sculpture of raised cords
..... Spiral cords about 4
...... Yellowish white, faintly banded with transparent flesh color.
52 x 13 mm. Ecuador .... plicata
Reeve f. 76 Sowerby pl.63, f. 61 Tryon pl.7, f.20

..... Spiral cords about 7
...... Flesh colored, with occasional brown flecks
27 x 6 mm. Lower California .... [illegible]
Bull. Mus. Comp. Zool. v. 43, p. 252

..... Spiral cords about 12
...... Straw colored
36 x 7 mm Cape San Lucas .... lucana
Bull, Mus. Comp. Zool. v. 43 , p. 252

. Sutural band nodulous, followed by a smooth band, then 3 spiral rows of nodes.
.. Transparent ash, obscurely red spotted, purplish towards apex
55 x 15 mm San Blas to Panama .... tuberculosa
Reeve f. 61 Sowerby pl. 63 fig. 48 Tryon pl.7, f. 31.

. Sutural band with a double row of nodes, separated by a groove
.. White, more or less banded with reddish brown
45 x 12 mm Chile .... gemmulata
Reeve fig. 33

. Sutural band excavated
.. Axial ribs strong, whorls strongly rounded
... Variously purple banded
23 x 8 mm Central America .... varicosa
Reeve fig. 120 Sowerby text pl. 163 Tryon pl.7, f. 12

Family CONIDAE

Genus Conus Linnaeus,1758. Type (by subsequent designation, Children,1823), Conus marmoreus Linnaeus. (fide Grant and Gale,1931, p. 471). Clench in Johnsonia, no.6, p.3 states " According to Iredale (1930, p.79), the genotype of Conus is C. litteratus Linnaeus , designated by Swainson (1940, Treat. Malac. p. 148). However, we accept the advise of Dr. A. Myra Keen as follows (Per. Comm. April,1945) " Re the type of Conus: I have looked up Iredale's statement but cannot concur with him. Children in 1823 designated C. marmoreus in a perfectly valid manner so far as I can determine."

" Shell obconic, usually heavy and strong, generally ornamented with bright colors which are diffused, banded or spotted. Aperture generally long and narrow with a simple lip. Whorls numerous, rather tightly coiled and moderately descending. Inner whorls generally absorbed to a paper-thinness. Sculpture when present usually of a minor nature consisting of low riblets which may be smooth or tuberculate. Periostracum thin to heavy and often sculptured to a moderate degree. Teeth relatively few, proportionately long and equipped with a poison gland. This aparatus is capable of injecting an exceedingly powerful neurotaxin into its prey." (Johnsonia. no.6, p. 3).

Conus californicus Hinds,1844. Farallone Islands, California to Ballenas Lagoon, Lower California, Mexico (Dall). Type locality, Magdalena Bay, Lower California, Mexico in seven fathoms, on a sandy floor". (fide Grant and Gale, p. 472).

Collecting data: This is the only species of Conus in our fauna and is exceedingly common the length of the range being taken far up in all estuaries as wellas along the open coast and down to at least 25 fathoms. It seems to favor sand or gravel bottom when dredged rather than mud and is found in more or less the same habitat littoral. The only thing of particular interest in our experience with this species is that it seems to develop local races of varying sizes and shapes. One interesting item is the phenomenal size of the specimens dredged off El Segundo, Calif. in 15 to 20 fathoms. The water there is badly polluted by sewage from the great Los Angeles outfal sewer which has been causing so much litigation and trouble. Incidentally the Recent specimens from this locality are almost a perfect fit for the fossil variety fossilis Oldroyd. The species attains exceptional size in Morro Bay also. Other localities produce consistently very small specimens. The color varies also. Of course, it is but one species. (Burch).

Mr. A.G. Smith reports on this species from Monterey " Fine large specimens (as large as fossilis) live at extreme low water in sand pockets between the rocks at Monterey and Pacific Grove. Also dredged down to 15 fms. in the Bay. Dr. Hanna is of the opinion that the large size of the El Segundo Conus is due probably not to the fact that it lives and waxes fat on the garbage, but rather on the other organisms attracted by the garbage and sewage. His ideas are based on a recent study of the radula of C. californicus."

Dr. A. Myra Keen also notes on this matter " As to large specimens of Conus californicus: Mrs. Oldroyd labelled some as C. c. fossilis. Like most of Mrs. Oldroyd's varieties, this one seems to be only ecological."

The species is reported from San Martin Island, Lower California by Dr. Fred Baker.

The following list of species of the genus Conus covering the entire west coast will be of interest to some of the members. This is taken from Mr. A.M. Strong's notebook.

Genus Conus Linnaeus,1758.

Conus californicus Hinds,1844. (Farallones to Ballenas Lagoon).
Conus arcuatus B. & S.,1829. (Cerros Island to Panama)
Conus tornatus Broderip,1833. (Cerros Island to Ecuador)
Conus scalaris Val. (Cerros Island to Panama)
Conus comptus Gould,1856 *— perplexus Sby. (Cerros Island to Costa Rica)
Conus monilifer Brod. & Sby.,1833. (Magdalena Bay to Peru)
Conus mahogani Reeve,1843. (Magdalena Bay to Panama)
Conus lucidus Mawe,Wood,1828. (Magdalena Bay to Galapagos)
Conus purpurascens Sowerby,1833. (Magdalena Bay to Peru)
Conus princeps Linnaeus,1758. (Gulf of Calif. to Peru)
Conus gladiator Broderip,1833. (Gulf of Calif. to Panama) (Ecuador)
Conus brunneus (Mawe) Wood,1828. (Gulf of Calif. to Ecuador)
Conus nux Broderip,1833. (Gulf of Calif. to Ecuador)
Conus incurvus Brod. ? -- recurvus Brod. (Gulf of Calif. to Ecuador)
Conus gradatus (Mawe) Wood,1828. (Gulf of Calif. to Panama)
Conus regularis Sowerby,1841. (Gulf of Calif. to Panama)
Conus dispar Sowerby,1841. (Gulf of California)
Conus dalli Stearns (Gulf of Calif. to Panama)
Conus edaphus Dall (Gulf of Calif. to Central America)
Conus archon Broderip,1833. (Gulf of Calif. to Central America).
Conus emarginatus Reeve,1843. (Acapulco,Mex. to Ecuador)
Conus vittatus Hwass?Bruguiere,1792. (Acapulco to Panama)
Conus pyriformis Reeve (Central America)
Conus fergusoni Sowerby,1875 — xanthicus Dall (Central America to Panama) (Mazatlan Bay, West Mexico).
Conus ximenes Gray,1839 (Acapulco; Panama to Peru) (Punta Penasco)
Conus scriphus Dall,1911 or 10 (Panama)
Conus vergatus Reeve (Gulf of Calif. to Ecuador)
Conus tiaratus Broderip (Galapagos)
Conus signae Bartsch,1939. (Gulf of Calif. to Panama)
Conus magdalensis Bartsch & Rehder (Magdalena Bay)
Conus recurvus Brod. (West Mexico)

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The following key to the species of the genus Conus is taken from Mr. A.M. Strong's notebook.

Genus Conus

Shoulder of the whorls tuberculate
. Tubercles on early whorls only
.. Whitish, tinged with flesh color
75 mm. Central America .... pyriformis
Reeve, fig. 70

. Tubercles becoming faint on the body whorl
.. Brownish, orange or pink, with darker axial stripes
60 mm Gulf of Calif. to Peru .... princeps
Reeve, fig. 36a

.. Brown, with axial streaks and obscure central spiral band of white
40 mm. Gulf of Calif. to Panama .... gladiator
Reeve, fig. 127

. Tubercles distinct on all whorls
.. Brownish, with one or two spiral bands of white spots
40 mm. Gulf of Calif. to Ecuador .... brunneus
Reeve, fig. 72

.. White, with two spiral bands of dark blotches, base and lower end of aperture purple.
25 mm. Ballenas Lagoon to Panama .... nux
Reeve, fig. 110

.. Pale rose color with a few brown spots
Panama to Peru .... ximenes
Reeve, fig. 224

Shoulder of the whorls carinated
. Spire much elevated
.. White, with broad waved brown streaks
Acapulco to Ecuador .... emarginatus
Reeve, fig. 152

.. Whitish, marbled and streaked with chestnut
40 mm. Cerros Island to Panama .... arcuatus
Reeve, 77 b

.. Brownish white, with spiral rows of dark dots and two faint darker spiral bands
25 mm. Cerros Island to Ecuador .... tornatus
Reeve, fig. 68

. Spire relatively short
.. Livid flesh color, spotted and clouded with brown
25 mm. Gulf of Calif. to Ecuador .... incurvus
Reeve, fig. 158

.. Yellowish white, with zigzag brown streaks and a lighter central band
35 mm. Panama .... scariphus
Proc. U.S.N.M. 38-225

Shoulder of whorls not nodulous or carinated
. Spire elevated, with a concave outline
.. Whorls sharply tabulated, forming a turrites spire
... Yellowish white, with brown axial stripes and a narrow white central band
75 mm. Cerros Island to Panama .... scalaris
Tryon, v.6, p. 35

... White with reddish brown axial clouding
Gulf of Calif. to Panama .... gradatus
Reeve, fig. 140

Shoulder of whorls not nodulous or carinated, continued
. Spire elevated, with a concave outline, continued
.. Whorls broadly, rather flatly tabulated
... Whitish, stained and banded with brown spots
60 mm. Mazatlan to Panama .... regularis
Reeve, fig. 146

... More slender, with smaller and more distant spiral rows of squarish brown spots
50 mm. Magdalena Bay to Peru .... monilifer
Reeve, fig. 144

... Spire much shorter, with obscure indications of paler spiral bands
Gulf of Calif. .... dispar
Sowerby, Conch. III, fig. 57

.. Whorls narrowly sloping or rounded
... Whitish, with longitudinal clouds and close spiral rows of small chestnut spots.
Magdalena Bay to Panama .... mahogani
Reeve, figs. 125 & 126

... Shell stouter, with the spiral markings tending toward an anterior and posterior band
30 mm. Cerros Island to Costa Rica .... comptus
Reeve, fig. 116

. Spire low, convex or flat sided
.. Whorls channeled between shoulder and suture
... Shell uniformly white or light colored
140 mm. Central America .... ferguson
Tryon, vol. 6, p. 15

... Clouded with white or violaceous and brown or olive
75 mm. Magdalena Bay to Peru .... purpurascens
Reeve fig. 105

... White, with broad brownish yellow areas forming three bands
42 mm. Guaymas to Panama .... xanthiocus
Proc. U.S.N.M. 38 p. 225

.. Whorls not channeled
... Color patern of close, regular markings
.... Yellowish brown, with brown axial stripes and four rows of white spots
55 mm. Gulf of Calif. to Panama .... dalli
Tryon, f.6, p. 91.

.... White, reticulated with brown lines
60 mm. Magdalena Bay to Galapagos .... lucidus
Reeve, fig. 52

.... Waxen white, with spiral bands of alternating red and white spots
25 mm. Gulf of California .... edaphus
Proc. U.S.N.M. 38 p. 223

... Color patern irregular or indistinct
.... Pink brown, with axial maculations and spiral rows of brown leaving a central light band
50 mm. Acapulco to Panama .... vittatus
Reeve, fig. 75

.... White, with irregular brown streaks and a few brown spiral lines
60 mm. Mazatlan to Central America .... archon
Proc. U.S.N.M. 38 p. 223

.... Brown, with small, irregularly placed white spots
30 mm. Farallones to Ballenas Lagoon .... californicus
Reeve, fig. 224

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Family TURRIDAE

* Note* Inasmuch as Dr. Paul Bartsch is working on his monograph of this family, and Dr. Bartsch has written that it will not be long delayed, we have elected to by-pass this group for the time being and return to it later hoping that Dr. Bartsch's work will be by then completed.

Mytilus edulis diegensis , new subspecies

By Dr. Wesley R. Coe, The Scripps Institution of Oceanography, La Jolla, California.

I was much interested in the discussion in the minutes of the Conchological Club, No. 36, relative to the status of the species of Mytilus which has become so abundant along our coast in recent years. It was first found on the pier of the Scripps Institution in August,1943. In the early summer of 1944 there were extensive colonies covering all suitable situations on the piles, on ropes and boxes suspended from the pier, as well as on many of the rocks in the vicinity. Most of these colonies failed to survive the summer but a few still remain.

After culturing the newly arrived Mytilus in experimental boxes for a year and a half and studying large collections from a variety of habitats from San Pedro to the Mexican border, I have come to the conclusion that this is not an introduced species in spite of its behavior. I have compared hundreds of shells of all ages with some that were collected near San Diego many years ago and can find no consistent differences. But I do find differences between this form and the typical introduced M. edulis of San Francisco Bay and M. edulis trossulus of Puget Sound. Our southern form is in my opinion an endemic subspecies of M. edulis previously unrecognized as such. This I am calling M. edulis diegensis. It is distinctly different from M. grayanus and from all the subspecies of M. edulis or other species described in the recent monograph by Lamy.

A rapidly fluctuating population such as is well known to occur with M. edulis in other localities and as we know for Donax and other mollusks may, perhaps, explain the sudden increase to such vast numbers.

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The Mytilus discussed above was figured in Minutes # 36, p.6 and the data given on pages 8,9. In Minutes # 41, pages 7 to 13, Mr. Allyn G. Smith covered the problem at length.

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Corrections and Additions

Minutes # 48, p.9. Pleurobranchus californicus Dall,1900. Mr. A.G. Smith reports the following: " 11 mi. n. of Fort Bragg; 1 specimen. Beach at Pacific Grove, 2 specimens. Breakwater, North Island (San Diego), 12 specimens. A rare species found under rocks at low tide."

Minutes # 47, p. 10. Acteon punctocoelata Carpenter. Mr. W.K. Emerson reports it from Point Loma, San Diego Co.

Minutes # 47, p. 12- Acteocina culcitella (Gould),1852. Mr. W.K. Emerson reports this species from Mission Bay.

Minutes # 47, p. 15- Coleophysis carinata (Carpenter),1857. W.K. Emerson reports this from Mission Bay, San Diego Co.

Minutes # 43, p.27- Solen sicarius Gould,1850. Mr. Morris E. Caruthers reports taking this species a mile inside Morro Bay, San Luis Obispo Co.

Minutes # 43, p. 27. Ensis californicus Dall,1899. Mr. Morris E. Caruthers reports taking this species in Newport Bay and also in Mission Bay.

Minutes # 43, pp. 27,28. Siliqua lucida(Conrad),1837. Mr. Morris E. Caruthers reports taking this species in Mission Bay, Newport Bay and also from one mile inside Morro Bay.

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CORRECTIONS AND ADDITIONS

Minutes # 46, p. 13 - Dentalium splendidum G.B. Sowerby,1832. Mr. George Willett advises " Dr. Pilsbry has confirmed my identification of 5 specimens of D. splendidum Sby. from Los Coronados. He states they are smaller than the type, but indistinguishable from smaller specimens". The result of this is the definite addition of this species to our faunal list.
Minutes # 46 p 12- Dentalium pretiosum Sowerby, 1860. Mr. George Willett advises " The range of D. pretiosum should read " Sitka, Alaska to San Diego. Sitka is considerably further north than Forrester Island.
Minutes # 46 p 15- Cadulus aberrans Whiteaves,1887. Mr. George Willett notes " After studying my northern Cadulus , using your key and figures, it seems probable that I have confused hepburni and aberrans, and that all my records of the former should apply to the latter.

Nuculana austini (Oldroyd),1935. Nautilus vol. 49, p. 13. This species was omited from our faunal list on the assumption that it is in the synonymy of N. minuta Fabricius,1776. Mr. A.M. Strong has a set labelled austini from 100 fathoms off Gabriola Pass. If Mr. Strong's specimens are true N. austini it is at once obvious that the species is not minuta. The Strong specimens are much more elongate. They are close to the specimens we have labelled N. minuta lomaensis Dall,1919. Mr. George Willett advises that austini is a good species in his opinion. Therefore we are returning this species to our list of west coast species of Nuculana.

Dr. A. Myra Keen comments on the species as follows " It may be that Nuculana austini Oldroyd is valid. The Stanford collection probably has enough dredged material from the Puget Sound area to answer the question if anyone ever has time to sit downand study it. Until then, perhaps it would be well to enter the name on the list tentatively."

Minutes #40 pp 15,16 Rochefortia pedroana Dall,1899. The following note was received some time ago from Mr. W.K. Emerson of San Diego " I find in the current Minutes an interesting account of finding on Blepharopoda occidentalis Randall a Rochefortia species. I collected species resembling your description on this sand crab at Pacific Beach, San Diego county. In 1940, they were common on the crustaceans near the Crystal Pier. Other B. occidentalis sps. examined near Mission Beach, Calif. possessed no shells attached to them. My specimens are white, with wrinkled, tan colored epidermis. I also have one complete Rochefortia sp. taken in sand at Coronado which is altogether different, and not identified. I understand Miss Wilson has also collected R. pedroana from sand crabs from La Jolla, Calif."

This is an extension of our range for this species southward from San Pedro to San Diego.

Minutes # 43 p 21- Gari californica (Conrad),1848. Bainbridge Island, Kitsap Co., Wash. July,1944 (W.J. Eyerdam)
Minutes # 43 p 22. Heterodonax bimaculata L. Corinto, Nicauragua, La Union, Salvador... Gulf of Fonseca,Honduras.. (W.J. Eyerdam,1938-39).
Minutes # 43 p 22- Sanguinolaria nuttallii Conrad Many specimens from Mission Bay reported by Mr. W.K. Emerson.

Dr. Paul Bartsch, Curator Division of Mollusks and Cenozoic Invertebrates, Smithsonian Institution, United States National Museum, Washington 25, D.C.

Your package containing the type of the species described by you came to hand almost simultaneously with the minutes. We, of course, are extremely happy that you made the U.S. National Museum the repository for these specimens. We have assigned to them the following catalogue numbers:

434052	Nuculana penderi redondoensis J.Q. Burch
434053	Cardita redondoensis J.Q. Burch
434051	Macoma morroensis T. Burch
434054	Bulla esteroensis J.Q.Burch

It will interest you to hear that I prepared, a little while ago, a paper on the mollusks of the Pacific world for the New York Zoological Society which contains sixteen plates. This is being published by Macmillan Company in bound form, and by the Infantry Journal in paper cover. The two are supposed to come out simultaneously sometime in May."

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Mr. A. Sorensen, 247 Granite St., Pacific Grove, Calif. We were indeed sorry to hear that Andy's proposed excursion to Mexico had to be postponed for another year. But we are very happy to conform to his request that we send copies of our minutes to,

Mr. George Pattison, 68 Partridge St., Glenley, South Australia.

Dr. B.R. Bales, 149 West Main St., Circleville, Ohio. " Dear John: Just back from a fine winter's collecting on the Fla. Keys. Found five numbers of Minutes waiting for me andas soon as I had most of the winter's take unpacked, began several hours good reading. No use talking, they are getting better and better all the time and I am sure you are accomplishing a really great task. I like Tom's drawings- they give me an adequate picture of the shell parts depicted.

We had a very successful winter and I brought home a lot of loot. We were established at Marathon, on Key Vaca, and worked north from there to Conch,Grassy,Bonefish, and Lower Matecumbe Keys; working south, we had Ohio,Missouri,Bahia Honda, and Little Duck Keys. I have collected in the region so often that I knew about where to go and when to go to the various Keys, though I did a lot of my collecting back of our cottage (Boot Key Harbor) where I took the festive mollusk the hard way-- by screening. Most of the material so taken has not yet been identified, but I am sure that I have some good things in the lot. We were fortunate in taking specimens of Cancellaria reticulata adeleae Pilsbry at Little Duck Key. These are plenty rare and I think none have been taken at any other place on the Keys. I am sure that there are less than two dozen known in collections, so all are locotypes. Dr. Pilsbry and Tom McGinty are working on a series of papers to appear in some future numbers of the Nautilus. They are working on the " little fellers"- Cyclostrema etc. and Tom is making some wonderful drawings to illustrate the articles. Have had a rather successful Cypraea season- took quite a few Cypraea exanthema, C. exanthema cervus, one lohely Cypraea cinerea, a couple dozen Cypraea spurca. These latter are surely little beauties when alive. Collected with Tom McGinty and Mr.and Mrs. Ralph Humes at Night with gasolene lanterns on Peanut Island in the northern end of Lake Worth. Plenty of imature Tonna galea, Archetectonica granulata, Hydatina vesicaria, Cassis gibbus and the like. We left Boynton at about eleven P.M. and were back home in time for breakfast the next morning. Day collecting at the same place gave us plenty of Cypraea spurca,

Family CANCELLARIIDAE

The following data is taken from the notebook of Mr. A.M. Strong.

Genus,subgenus, and section names mentioned in west coast records.

Cancellaria Lamarck, Lamarck,1799 Vide Grant and Gale the type is Voluta reticulata Linne (by monotypy). Woodring gives the same type. West Indies. Thiele gives the type as C. cancellata Linne.

Merica H. & A. Adams. Grant and Gale list as a synonym of Cancellaria s.s. Thiele lists as a section of Cancellaria s.s. and gives type C. melan--ostoma Sby. Dall gives same type and lists several west coast species in Bull. Mus. Comp. Zool. ? is can be used for them.

Euclia H. & A. Adams. Grant and Gale list as a synonym of Cancellaria s.s. Thiele as a section of Cancellaria s.s. and gives type C. solida Sby. a west coast shell. Cossmann gives type as C. cassidiformis Sby. also a west coast shell.

Narona H. & A. Adams. Grant and Gale give type as C. clavatula Sby. (by subsequent designation Cossmann), a west coast shell.
Thiele lists it as a subgenus and gives the same type.
Dall, Bull. Mus. Comp. Zool. gives the type as C. mitraeformis Sowerby, not Brocchi. Sowerby describes C. mitriformis, a west coast shell. C. mitraeformis is an older name and vide Thiele is the type of the section Brocchina Jouss.

Aphere H. & A. Adams,1854. Grant and Gale list as ? synonym of Cancellaria s.s. Thiele lists it as a subgenus. Type (by monotypy) C. tessellata Sowerby, a w est coast species.

Progabbia Dall. Grant and Gale list it as a synonym of Narona H. & A. Adams. Thiele lists as a section under Narona. If the subsequent designation of C. clavatula is correct it is entirely distinct from Narona. If C. mitriformis is used for the type of Narona there is not much difference. Both are west coast species. If C. cassidiformis Sby. is the type of Euclia, Progabbia is same.

Massyla H. & A. Adams,1854. Not mentioned by Grant and Gale or by Woodring. Thiele lists as a section under Aphere. Type (by monotypy), C.corrugata Hinds, a west coast species.

Crawfordiana Dall. described by Dall as a section under Progabbia.
Grant and Gale list it as a section under Cancellaria s.s.
Thiele lists it as a section under Narona. Type (by original designat--ion), C. crawfordiana Dall.

Trigonostoma Blainville,1826. Thiele lists as a subgenus and gives as the type C. trigonostoma Deshayes. Woodring gives the type (by monotypy), Delphinula trigonostoma Lamarck. Grant and Gale list (p.622),Trigona Perry,1811, type T. pellucida Perry equal C. trigonostomia Lamarck , not Trigonia Megerle,1811. Type an Indo-Pacific shell and some west coast species certainly belong here.

Bivetopsia Jouss. Thiele lists as a synonym os Cancellaria s.s. Woodring gives the type (by subsequent designation, Cossmann), C. chrysotoma Sowerby, a west coast shell. (Has the wide umbilicus of Trigonostoma.

Sveltella Cossmann. Thiele lists as a section of Narona and gives type as parva Phil. (Not the type in Cossmann, p. 29).

Sveltia Jouss. Used by Dall in Bull. 112. Type Jouss P. 20 C. varicosa Pliocene.

Cossmann's arrangement, Ess. Paleo. Corp., vol.3,1899.
Cancellaria Type, reticulata Linne)(p. 10).
Aperture without canal, deeply indented, with siphonal fasciole.
Cancellaria
Not turrited, 3 plicate
Cancellaria s.s.
Outer lip dentate
Narona Type C. clavatula Sby. (p.5).
Merica Type C. melanostoma Sowerby (asperella Lam.) (p. 10)
Aperture without canal, with siphonal fasciole
Merica Not turrited
Merica s.s. Plications oblique
Aphere Type C. tessellata Sby. (p. 17)
Siphonal fasciole obsolete
Trigonostoma Type, C. trigonostoma Desh. in Lam. (p.24)
Umbilicate.
Trigonostoma Aperture trigonal
Trigonostoma 3 plicate
Admete Kroyer,1842. Type A. viridula Fab. (p.31)
Not umbilicate, without siphonal fasciole, 3 plications
Admete s.s.
Benthobia
Massyla Type, C. corrugata Hinds (p.39)
2 elongate plications.
Massyla Fusiform.
(Bivetopsia Jouss. is listed as a synonym of Bivetia Jouss. The type of the Bivetopsia is stated to be C. chrysostoma Sby. (p.8))
Euclia is listed as a synonym of Cancellaria s.s. and the type is stated to be C. cassidiformis Sby.

Thiele p. 352
Genus Cancellaria
Section Cancellaria (Syh. Buccinella Perry,1811- Plicaria Fabricius 1823- Bivetia Jouss.,1887- Bivetopsia Jouss.)
Type C. cancellata Linne.
Section Euclia H. & A. Adams,1854. (Syn. Heteroculia Roesseti,1899)
Type C. solida Sby.
Section Merica H. & A. Adams,1854. Type, C. melanostoma Sowerby.
Subgenus Trigonostoma Blainville,1826
Section Trigonostomia s.s. Type, C. trigonostoma Deshayes
Section Ventrila Jouss. Type, C. ventrilia Jouss.
Subgenus Narona H. & A. Adams,1854. Type. C. clavatula Sowerby.
Section Sveltella Cossmann,1889. Type C. philippi Cossmann-parva Phil.
Section Tribia Jouss. Type. C. angasi Cross.
Section Solatia Jouss. Type. C. piscatoria Gmelin.
Section Mericella n. sec. Type. C. jucunda Thiele.
Section Microsveltia Iredale,1925. Type. C. rocess Iredale.
Section Brocchina Jouss.,1887. Type. C. mitraeformis Brocchi.
Section Progabbia Dall,1918. Type. C. cooperi Gabb.
Section Crawfordiana Dall,1918. Type C. crawfprdiana Dall.
Subgenus Aphere H. & A. Adams/
Section Aphere s.s. Type C. tessellata Sowerby.
Section Massyla H. & A. Adams,1854. Type C. corrugata Hinds.
Genus Admete Type. A. viridula Fab.

Family CANCELLARIIDAE

Key to west coast genera and subgenera

Columella straight, with from one to three plications.
. A well developed siphonal fasciole and a stromboid notch present
.. Umbilicus covered or reduced to a narrow chink.... Cancellaria
... Varices absent
.... Axial ribs not spinous at the shoulder of the whorls (Cancellaria)
.... Axial ribs rising to short spines at the shoulder ... (Euclia)
... Irregularly placed varices present ....(Narona)
.. Umbilicus open,rather narrow,bounded by the fasciole .. Bivetopsia
.. Umbilicus wide,funnel shaped, aperture triangular ..... Trigonostomia
. Siphonal fasciole feeble or obsolete, plaits small, oblique Massyla
..Shell slender,apex pointed, body with a slight callus .... (Massyla)
.. Shell cylindrical or ovate, body callus strong and wide .. (Aphera)
Columella curved, plaits faint or obsolete .... Admete

Perhaps we should call attention here to some very interesting changes in nomenclature. We are accepting the classification of Mr. A.M.. Strong which will be discussed at length below. However, a brief summary of the changes involved follow. Mr. Strong lists but one species under the genus Cancellaria and that is C. cooperi Gabb which is placed under the subgenus Euclia H. & A. Adams. Mr. Strong uses as a genus, Massyla H. & A. Adams, under which he places the species io and corbicula (under subgenus Aphera H. & A. Adams.), crawfordiana (under Massyla s.s.), and also under Massyla s.s. he places the species modesta,unalaskensis, and circumcincta; and also places the following species (under the genus Admete by Dall) in Massyla s.s., rhyssa, gracilior, woodworthi; and the species of Admete by Dall placed under Massyla, subgenus Aphera are californica and microsoma. Mr. Strong retains under the genus Admete only the following species: couthouyi, couthouyi laevior,middendorffiana, and undata.

Genus Cancellaria Lamarck,1799. Type (by monotypy), Voluta reticulata Linnaeus, Recent, Florida and West Indies, figured by Sowerby in Thes. Conch., vol.2, Cancellaria,1849, pl.92,fig.17.

" Shell oval, variously sculptured or smooth; last whorl ventricose; aperture with a short canal; columella straight,with two distinct folds and terminating with a third, plate-like fold. There is a well developed siphonal fasciole which covers the umbilicus or reduces it to a narrow chink at certain stages of growth and the outer lip shows a shallow stromboid notch, varying in depth with the stages of growth."

Subgenus Cancellaria s.s.

" Sculpture reticulate, either on the spire or over the entire surface, without varices, the intersections of the axial ribs and spiral cords usually forming rounded nodules but not spinous"

Cancellaria s.s. is not represented in the California fauna, but there are a number of species in the southern fauna which will be listed on the next page and followed by Mr. Strong's key to species.

West Coast Species of Cancellaria s.s.

Cancellaria obesa Sowerby,1832. (Cerros Island to Peru)
Cancellaria ovata Sowerby,1832. (Ecuador)
Cancellaria solida Sowerby,1832. (Gulf of California to Peru)

Cancellaria bulbula Sowerby,1832. (Corinto)
Cancellaria decussata Sowerby,1832. (Cerros Island to Peru)
Cancellaria ventricosa Hinds,1843. (Magdalena Bay to Central America)
Cancellaria albida Hinds,1843. (West Mexico to Ecuador)
Cancellaria indentata Sowerby,1832. (West Mexico to Panama)
Cancellaria cremata Hinds,1843. (West Mexico to Central America)
Cancellaria urceolata Hinds,1843. (Magdalena Bay to Panama)
Cancellaria gemmulata Sowerby,1832. (Gulf of Calif. to Galapagos)
Cancellaria acuminata Sowerby,1832. (Central America)
Cancellaria peruviana Strong and Hertlein (Peru)
Cancellaria buccinoidea Sowerby,1832. (Nicaragua to Chile)
Cancellaria balboae Pilsbry,1931. (Panama)
Cancellaria elata Hinds,1843. (Panama)

Key to the West Coast Species in the Subgenus Cancellaria s.s.
Sculpture faint or obsolete on the body whorl
• Columella short, upper plait very strong
•• Body whorl somewhat cylindrical
Length 45, diameter 25 mm .... obesa
•• Body whorl tapering anteriorly
Length 35, diameter 20 mm .... ovata
• Columella longer, plaits oblique
•• Body whorl smooth, polished
Length 40, diameter 30 mm .... solida
•• Body whorl with faint axial sculpture
Length 30, diameter 20 mm .... bulbula
Reticulate sculpture extending over the entire surface
• Axial ribs and spiral cords equal in strength and spacing
•• Whorls rounded, not shouldered
Length 40, diameter 20 mm .... decussata
•• Whorls narrowly, roundly shouldered
••• Shell ovate, orange brown
Lenth 30, diameter .... ventricosa
••• Shell slender, white
Length 25, diameter .... albida
•• Whorls sharply, flatly shouldered
•••Axial ribs close spaced, about 20 on the body whorl
Length 25, diameter 15 mm .... indentata
••• Axial ribs wide spaced, about 12 on the body whorl
Length 20, diameter .... crenata
• Axial ribs stronger than the spiral cords
••Body whorl flattened on the sides
Length 35, diameter .... urceolata
•• Body whorl well rounded, not shouldered
••• Shell thick, with coarse sculpture
Length 25, diameter 15 mm .... gemmulata
••• Shell comparatively thin, with fine sculpture
•••• Axial ribs close spaced
Length 25, diameter 14 mm .... acuminata
•••• Axial ribs wide spaced .... peruviana
•• Body whorl angularly shouldered
•••Shoulder narrow, sloping
Length 40, diameter 25 mm .... buccinoides
••• Shoulder wide, flattly sloping
Length 45, diameter 21 mm .... balboae
••• Shoulder wide, almost tabulate length 20 .... elata

Subgenus Euclia H. & A. Adams,1854. Type (by subsequent designation, Cossmann,1903), Cancellaria cassidiformis Sowerby, living, west coast of America. Progabbia Dall,1919 is in the synonymy.

" Shell pyriform, not umbilicated; spire very short, whorls smooth; columella with strong, anterior plaits" (Adams).

Mr. A.M. Strong discusses this subgenus " H. and A. Adams listed four species under Euclia. Cossmann in 1899 seems to have been the first to designate the type. Dall considered the first species in the original list, C. solida Sowerby, was the type. Some of the characters of the two species are quite different, but the similarity of C. cassidiformis to C. cooperi makes Dall's new subgenus unnecessary.

Dall evidently intended to include a number of west coast species in his subgenus Progabbia as he states;" I have come to the conclusion that the California species of the genus Cancellaria, in its wider sense can not properly be included in any of the groups into which it has hitherto been divided." As he only gives the type and lists no other species under his new subgenus there is no way of knowing what he considered to be the distinguishing characters. As here used the subgenus Euclia in the west coast fauna is restricted to two species, characterized by having wide spaced axial ribs rising to spines at the shoulder of the whorls."

Key to the west coast species in the subgenus Euclia

Shell broad, somewhat pyriform
   Length 60, diameter 40 mm .... cassidiformis
Shell slender, somewhat fusiform
   Length 80, diameter 35 mm .... cooperi

Cancellaria (Euclia) cooperi Gabb,1865. Monterey, Calif. to Coronado Islands (Dall). Dr. A. Myra Keen advises " Gabb cites specimens of C. cooperi from both San Diego and Monterey. Until the holotype is detected, possibly at the University of California, the type locality is uncertain".

Mr. A.M. Strong notes " This is the largest of the west coast Caneellariidae. The shell is elongate, slopingly shouldered; axial sculpture of about 15 ribs, stong on the spire, becoming faint on the body whorl but rising to small, sharp spines or tubercles on the shoulder angle; spiral sculpture of fine, close spaced cords. The color is brownish with narrow, darker lines. Oldroyd gives the measurements as, long. 80; diameter of the body whorl, 35 mm."

Collecting data: Dredged off Redondo Beach, Calif. in 35 fms., mud bottom, off El Segundo, Calif. and off Monterey in 40 fms. (Burch); off Monterey, 15-300 fathoms, in mud; rare. You already have my note on getting them on set lines. This species evidently grows quite large in the Bay. I once saw a specimen 7 or 8 inches long among some shells collected years ago by Miss I.F. Deming, of Pacific Grove (A. G. Smith); Newport,Calif. (H.N. Lowe); Redondo (Chaney); Point Loma- 1 fair sized and 1 young dredged (Gripp); So. Coronado Island, 1 dead specimen dredged (Dr. F. Baker).

Subgenus Narona H. & A. Adams. Type (by subsequent designation, Cossmann), Cancellaria clavatula Sowerby, living, west coast of America.

Mr. A.M. Strong discusses this subgenus as follows : " H. & A. Adams included a number of species under Narona. Of these Cossmann designated C. clavatula as the type and this seems to have been the first definite statement of a type. Dall and others have considered Cancellaria mitri-

-formis Sowerby to be the type and have grouped a number of the slender mitra-like species under the name. Narona, as represented by the type, differs from all other groups in Cancellariidae in the presence of irregularly placed varices. The shell is rather slender, not umbilicate, the siphonal fasciole not prominent and the columellar plaits strong. As here used only the two varicose species occuring in the west coast fauna are considered to belong to the subgenus."

Cancellaria (Narona) clavatula Sowerby,1832. (Gulf of Calif. to Peru).
Cancellaria (Narona) exopleura Dall,1908. (Central America to Peru).

Axial ribs strong, about 15 appearing on the body whorl ... clavatula
Axial ribs low, sharp, numerous .... exopleura

Genus Bivetopsia Jousseame,1887. La Naturaliste, ser. 2, year 9, p. 193. Type (by subsequent designation, Cossmann) Cancellaria chrysostoma Sowerby, living, west coast of America.

This genus is not represented in the California fauna, but there are a number of species in the southern fauna. Mr. A.M. Stromg's discussion and keys follow: The group, here placed in a separate genus with C. chrysostoma Sowerby as the type, is quite distinct in the west coast fauna. They are characterized by a narrow, open, deep umbilicus bounded by a distinct siphonal fasciole. All are subglobose to broadly turrited shells with well developed sculpture and are confined to tropical or subtropical waters. As in typical Cancellaria the columella has two strong plaits and ends in a plait like fold."

Bivetopsia funiculata (Hinds),1843. (Gulf of Calif. to West Mexico)
Bivetopsia chrysostoma (Sowerby),1832. (Panama to Peru)
Bivetopsia haemastoma (Sowerby),1832. (Galapagos)
Bivetopsia brevis (Sowerby),1832. (Gulf of California to Ecuador)
Bivetopsia pulchra (Sowerby),1832. (Central America to Ecuador)
Bivetopsia centrota (Dall),1896. (Gulf of Calif. to Cocos Island)
Bivetopsia cumingiana (Petit),1844. (Peru)
Bivetopsia tuberculosa (Sowerby),1832. (Peru to Chile)
Bivetopsia bullata (Sowerby),1832. (Cerros Island to Panama).

Key to species of the genus Bivetopsia
Axial ribs strong, not spinous
. Shell subglobose
.. Spiral cords broad, strong
Length 37, breadth 20 mm .... chrysostoma
.. Spiral cords fine, alternating in strength
Length 27, breadth 17 mm .... haemastoma
.. Spiral sculpture obsolete
Length 20, breadth 15 mm .... brevis
. Shell broadly turrited
Length 20 mm .... funiculata
Axial ribs spinous at the intersection with the spiral cords
. Intersections forming raised, angular points
Length 28, breadth 20 mm .... pulchra
. Shoulder pf whorls with long, guttered spines
Length 35, breadth 20 mm .... centrota
Axial ribs indistinct or obsolete
. Spiral sculpture of deep grooves .... cumingiana
. Shoulder and periphery with spiral rows of nodes
.. Nodes on the shoulder axially elongate
Length 35, breadth 27 mm .... tuberculata

.. Nodes at the shoulder spirally elongate
Length 30, breadth 25 mm .... bullata

Genus Trigonostomia Blainville,1826. Mem. de Conch.,1826, p.652. Type (by monotypy), Delphinula trigonostomia Desh. in Lam., figured in Reeve, Conch. Ic. Cancellaria, vol. 10, pl. 11, fig.51.

Mr. Strong notes " Trigona pellucida Perry is very similar to, if not identical with Delphinula trigonostomia Lamarck and both come from the same general locality. The use of Blainville's name may be open to question as it is considered by some to be a vernacular name. However, it has been used by many writers on conchology and paleontology.

The type is a loosely coiled shell with broadly, concavely, tabulated whorls,forming a triangular aperture. The siphonal fasciole is represented only by a ridge bordering the wide, funnel shaped umbilicus and the columella has two low plaits and an obscure basal fold."

This genus is not represented in the California fauna and the only species known from the west coast is the following from the southern range.

Trigonostomia goniostoma (Sowerby),1832. (Gulf of Calif. to Panama).

Genus Massyla H. & A. Adams,1854. Gen. Rec. Moll., vol.1,1854, p. 278. Type (by monotypy) Cancellaria corrugata Hinds, living, west coast of America. The following note from Dr. A. Myra Keen " The type of Massyla is by monotypy. As to recognizing this as a genus and reallocating species to it previously placed by Dall in Sveltia,I believe Mr. Strong is justified. ... The type of Sveltia is a European fossil species, of Massyla a Recent West American form."

Mr. A.M. Strong discusses the genus as follows: " The species in this genus differ from those in Cancellaria and Bivetopsia in that the siphonal fasciole and stromboid notch is faint or absent and the plaits on the columella are fine and very oblique. The lower end of the columella in some of the species is cut off obliquely with a very faint or no terminal plait."

" Shell ovate, turbinate; spire obtuse, whorls transversely striated; aperture contracted and emarginate anteriorly; columella truncate"(Adams).

Subgenus Massyla s.s.

" In the typical subgenus the shells are slender and have a more or less well defined canal. The enamel of the inner lip over the body of the shell is narrow or absent, and the umbilicus is covered or reduced to a narrow chink. With the exception of the type all the west coast species placed in the subgenus are known to range into cool waters, Peru and Chile on the south and from California to Alaska on the north."(Strong)

The following list of species covers the entire coast and will be followed by Mr. A.M. Strong's key to species. We will then take up a more detailed discussion of the species reported from San Diego northward.

Massyla (Massyla) corrugata (Hinds),1843. (Ecuador)
Massyla (Massyla) crawfordiana (Dall),1891. (Drakes Bay to San Diego)
Massyla (Massyla) philippi (Cossmann),1899. (Chile)
Massyla (Massyla) mitriformis Sowerby,1832. (Panama to Peru)
Massyla (Massyla) uniplicata (Sowerby),1832. (Acapulco to Chile)
Massyla (Massyla) unalaskensis (Dall),1873.(Unalaska to Cape Blanco,Ore.)
Massyla (Massyla) circumcincta (Dall),1873. (Alaska)
Massyla (Massyla) modesta (Carpenter),1863. (Aleutian Islands to Puget Snd

Massyla (Massyla) rhyssa (Dall),1919. (Santa Rosa Id. to Todos Santos B
Massyla (Massyla) gracilior (Carpenter),1866. (Alaska to San Diego)
Massyla (Massyla) woodworthi (Dall),1905. (Monterey).

Key to the west coast species in the genus Massyla s.s.

Adult shell over 10 mm in length
. Sculpture decussated with axial ribs and spiral cords
.. Whorls rounded or slightly shouldered
... Spiral cords numerous, slightly nodulous
Length 12 mm .... corrugata
... Spiral cords numerous, flat topped
Length 43, diameter 21 mm .... crawfordiana
... Spiral cords on spire 3, on last whorl 6 .... philippi
.. Whorls strongly shouldered
... Aperture ending in a distinct canal
Length 45, diameter 17.5 mm .... mitriformis
... Aperture ending in a sharp notch
Length 20, diameter 9 mm .... uniplicata
. Sculpture of strong spiral cords and short, nodulous
axial ribs. Length 20, diameter 7.5 mm .... unalaskensis
. Sculpture of spiral cords and faint axial riblets
Length 20, diameter 9 mm .... circumcincta
. Sculpture of spiral cords and fine lines of growth
Length 17, diameter 8.5 mm .... modesta
Adult shell less than 10 mm in length
. Sculpture decussated with axial ribs and spiral cords
.. Axial ribs 12, narrow, nearly vertical
Length 7, diameter 4.5.mm .... rhyssa
.. Axial ribs 10, strong, rounded
Length 9, diameter 4 mm .... gracilier
. Sculpture of spiral cords and faint axial riblets
Length 9, diameter 4.5 mm .... woodworthi

Massyla (Massyla) crawfordiana (Dall),1891. Drakes Bay to San Diego. Type locality, Drakes Bay near San Francisco. Ext. to Forrester Id.,Alaska.

Dr. Dall described a section Crawfordina Dall,1918 with type C. crawfordiana. This was followed by Grant and Gale, p. 614 and others.

" Shell slender, with moderately rounded whorls, which, when fresh, are covered with a coarse epidermis. The sculpture consists of from 15 to 20 axial ribs crossed by numerous flat topped spiral cords. The columella has two slender plaits and an obscure terminal plait. In the original description the color is given as pale brown and the measurements as Long. of shell 43, Max. diameter 21 mm." (Strong).

Collecting data: Dredged off Redondo Beach, Calif. in 50 fms., mud bottom but rare having brought it up twice in seven years of dredging. (Burch); Forrester Island, Alaska in 50 fms. (Willett); off Monterey, Calif. 50-70 fathoms, in mud scarce. Also 46 fms. in fine dark green sand off the Farallone Ids. (USBC Sta. 5789); 14 specimens. Taken off the Mendocino Co. coast (A.G. Smith); San Diego, Calif. 1 specimen from 50 fms. (Kelsey); San Pedro (Oldroyd); Monterey (Oliver); Drakes Bay (Arnheim).

Massyla (Massyla) unalaskensis (Dall),1873. Unalaska to Cape Blanco, Oregon. Type locality, 85 fathoms in Captain's Harbor,Unalaska, Aleutian Islands.

Dr. Dall placed this species and the following two under the subgenus

Sveltia Jousseaume,1888.

Grant and Gale place this in the genus Admete and state that it may be the young of Admete modesta Carpenter.

"The shell is slender, whitish, with a nut-brown epidermis, sculptured with strong spiral cords of which the posterior three are crossed by short axial ribs, nodulous at the intersections. The columella has two or three oblique plications. The measurements are given as, Long. 0.75, Lat. o.3 ins. (approximately 20 x 7.5 mm.)

Collecting data: Topotypes collected from Captain's Harbor, Unalaska Island, Aleutians in 25 fm s,1932 and Victoria, B.C. in 20 fms. (W.J. Eyerdam).

Massyla (Massyla) circumcincta (Dall),1873. Unalaska to Departure Bay, B.C. (H.N. Lowe Coll.). The type locality is stated in Oldroyd to be Popoff Strait, Shumagin Islands, but Dr. A. Myra Keen advises (Per. Comm. April,1945) " The type locality of M. circumcincta was not specified in the original, nor was it given in connection with illustration of the holotype."

" The shell is rose pink, thin and slender, sculptured with strong spiral cords crossed by faint, irregular, axial riblets on the upper whorls. The columella has two or three faint plications. The measurements of the type are given as, Long. .82, lat. .37 ins. (approximately 20 x 9 mm" (Strong).

Collecting data: Izhut Bay, Afognak Island, Alaska, 1922 (W.J. Eyerdam); Departure Bay, B.C. (H.N. Lowe Coll. in the San Diego Museum of Natural History).

Massyla (Massyla) modesta (Carpenter),1865. Aleutian Islands to Puget Sound. Type locality, Neah Bay, Wash.

Grant and Gale,1931, pp. 622,623 consider this species under the genus Admete and suggest that unalaskensis is the young of this species, and that gracilior is a variety of it. This has not been generally accepted.

" There is no figure of a typical specimen of this species and the identification of the fossil specimen is questionable. The shell is described as rather slender, reddish; whorls rounded, sculptured with spiral cords and fine lines of growth; the columella having two plaits and a minute basal plait. The measurements are given as Long. .68, lat. .34 ins. (approximately 17 x 8.5 mm)" (Strong)

Collecting data: Forrester Island, Craig, Ketchikan, Alaska in 15-40 fms. (G. Willett); Frederick Sound, Alaska in 12 fms. (Lewis); San Juan Islands, Str. of Juan de Fuca in 50 fms. (W.J. Eyerdam)(March,1927); our specimens of this species were dredged in Puget Sound by Professor Trevor Kincaid (Burch). There is a set in the San Diego Museum of Natural History labelled from off San Clemente Island by Wardwell. If this identification can be verified it is a great extension of the range southward.

Massyla (Massyla) rhyssa (Dall), 1919. Point Pinos, Calif. (A.G. Smith) to Todos Santos Bay, Lower Calif. (Burch). The type locality is: Off South Coronado Island, 55-155 fms. on the advice of Dr. A. Myra Keen.

This species was listed by Dr. Dall and others under the genus Admete. A note from Mr. George Willett on this species " Whorls rounded; axials (in adults) 14-15".

This small, unfigured species is sculptured with about 12,narrow,

axial ribs crossed by a few prominent spiral threads, somewhat nodose at the intersections. The columella has three oblique plaits. In the original description the measurements are given as , Height of shell 7, diameter 4.5 mm. " (Strong).

Collecting data: Abundant in dredgings off Redondo Beach in around 75 fathoms, mud bottom. However, we dredged it in as shallow as 20 fms. off Point Vicente, 40 fms. off Rocky Point, 50 fms. off Ensenada,Mex.(Burch); 65-71 fms. off Point Pinos, in green mud and sand; rare (A.G. Smith); Catalina Island, Calif. in 30 fms. (G. Willett); off Whites Point, Los Angeles County, Calif. (A.M. Strong);

Massyla (Massyla) gracilior (Carpenter),1866. Aleutian Islands to San Diego. Type locality, Santa Barbara Pliocene.

Mr. George Willett gives one note on this species " Whorls tabulated; azials (in adults) 12".

There has been a great deal of confusion and misidentification with this species. We identified some of our deep water specimens from off Redondo Beach as this species but were advised by Mr. Willett and Mr. Strong thatwe were in error. The only set we have so labelled in our collection at this time was dredged in Puget Sound off the San Juan Islands by Trevor Kincaid. (Burch). The species is described as having a subquadrate aperture and a general resemblance to modesta. Grant and Gale state that " the true gracilis Carpenter in Gabb is probably a variety of modesta." Mr. A.M. Strong states that the gracilior group certainly does not belong in Admete, and suggests that perhaps these and modesta should be listed in a new genus. The occurance of this species in the living fauna has been questioned. The possibility that rhyssa and gracilior may intergrade making rhyssa a synonym of gracilior has been suggested. The species was unfigured giving reason to the variety of opinions as to just what it is. Mr. George Willett suggests that the slight fifferences in shape of this species and rhyssa may be sexual, a matter about which no one seems to know. From C.A.S. 165, Oligocene or lower Miocene of Oregon, A. clatskaniensis Anderson and Martin is said by Dr. Hertlein to be similar. Mr. Strong comments on this that while it is true that they are very close it does not seem probable although not impossible that a shell of this kind would live from the lower Miocene to the present without change.

" Examination of a good series from the Santa Barbara Pleistocene, at points certainly very neat the type locality show that it is a quite distinct species. The shell is rather slender with well rounded whorls, sculptured with about 10 strong axial ribs crossed by a few fine spiral cords. The columella has two oblique plaits and an indistinct basal plait. In the original description the measurements are given as, Long. .35, lat. .16 in. (approximately 9 x 4 mm)." (Strong).

It is obvious that we are badly in need of further information on this species.

Collecting data: Catalina Island in 20-40 fms. (G. Willett); Akutan Island, Aleutian Islands, 1934, dredged, (I. Norberg) (Eyerdam); Izhut Bay, Afognak Island, Alaska, in 10 fms. mud,1922 (W.J. Eyerdam).

Dr. A. Myra Keen advises (Per. Comm.) " M. gracilior was reported at San Diego by Kelsey. I do not know its most northern occurance; as Dall says " with the type", I arbitrarily stated it to be 71 degrees in the Check List."

Massyla (Massyla) woodworthi (Dall),1905. Monterey to Santa Barbara Islands (Dall). Type locality, Monterey Bay in 10-45 fms.

" This unfigured species is said to be whitish with a yellow brown

epidermis, sculptured with 8 or 9 obscure riblets on the upper whorls and rounded spiral threads with wider interspaces. On the upper whorls the spiral thread at the shoulder is the most prominent giving them a subtabulate appearance. The measurements of the type are given as, Long. 9, max. diameter 4.5 mm." (Strong).

Collecting data: Monterey Bay: 10-45 fms. (Woodworth); 50 fms. off Point Pinos, in green mud and fine sand (USFC). Apparently all known specimens of this species are in the National Museum. Mac and I have not dredged it. (A.G.Smith).

Mr. A.M. Strong comments on this as follows: " It seems strange that no other specimens of *woodwardi* have been collected at Monterey, the type locality. From the description of the type of the species it is very similar to *gracilior* but with the axial sculpture much reduced. This is not an unusual individual variant. I have an idea that this should also be considered a synonym of *gracilior*, but no definite statement could be made without specimens for comparison."

Subgenus *Aphera* H. & A. Adams,1854. Gen. Rec. Shells, vol.1,1854, p. 277. Type (by monotypy), *Cancellaria tessellata* Sowerby, living, west coast of America.

" The shells placed in this subgenus are like those in the typical *Massyla* in the absence of the siphonal fasciole and in the small, oblique plaits on the columella. They differ in the more ovate shape, short or notched canal and in having the inner lip with a heavy callus spreading over the body of the shell" (Strong).

The following list of species in the subgenus *Aphera* covers the entire coast and will be followed by Mr. A.M. Strong's key. We will then take up a more detailed discussion of the species reported from San Diego northward.

Massyla (*Aphera*) *tessellata* (Sowerby),1832. (Gulf of Calif. to Peru)
Massyla (*Aphera*) *oblonga* (Sowerby),1825. (Panama)
Massyla (*Aphera*) *californica* (Dall),1908. (Oregon to Gulf of Calif.)
Massyla (*Aphera*) *corbicula* (Dall),1908. (Off Santa Barbara Islands)
Massyla (*Aphera*) *io* (Dall),1896. (San Diego to Panama)
Massyla (*Aphera ?*) *microsoma* (Dall),1908. (Coronado Ids. to Acapulco)

Key to the west coast species in the subgenus *Aphera*

Sculpture decussated with close spaced axial ribs and spiral cords
. Whorls evenly convex, not shouldered
.. Spire blunt, shorter than the aperture
Length 20, breadth 10 mm .... *tessellata*
.. Spire pointed, about as long as the spire .... *oblonga*
. Whorls slopingly shouldered
.. Axial ribs about 20 on the body whorl
Length 16, breadth 8.3 mm .... *californica*
.. Axial ribs about 36 on the body whorl
Length 21.5, breadth 9.5 mm .... *corbicula*
Sculpture of broad axial ribs and fine spiral threads
Length 43, breadth 21 mm .... *io*
Sculpture of spiral cords and lines of growth
Length 3.5, breadth 1.8 mm .... *microsoma*

Massyla (Aphera) californica (Dall),1908. Prince William Sound, Alaska (Eyerdam) to San Diego (Kelsey). to Gulf of California (Dall) Type locality, U.S.B.E. Sta. 2980 is off San Diego, Calif.,603 fms., mud, temp. 39 degrees F.

" In the original description Dall states " It has the aspect of an Admete, in spite of the presence of an umbilicus, but is perhaps only a delicate form of Trigonostoma." Grant and Gale state, " Admete californica Dall may be another variety (of couthouyi)." However, neither recognized the true type of Admete. The deep water species, californica, corbicula, and io might well be considered to form a distinct group in Cancellariidae.

The shell is described as thin, white with a pale epidermis, the whorls slopingly shouldered, sculptured with equally spaced, low, rounded, axial ribs and spiral cords. The aperture is without canal, the umbilicus rather large, in the young relatively smaller, and the columella with three plications. The figure shows the body of the shell to be covered with a wide callus. The measurements are given as, Length of shell, 16; max. diameter 8.3 mm." (Strong).

Collecting data: Elrington Island, Prince William Sound, Alaska, dredged. Extension of range northward from Tillamook, Oregon (W.J. Eyerdam); two specimens from 80 fms. off San Diego collected by Kelsey are in the San Diego Museum.

Massyla (Aphera) corbicula (Dall),1906. " Santa Barbara Islands to Coronado Islands" (Dall). Type locality, U.S.S. Albatross Station 2936, off San Diego.

" The shell is milk white with a thin epidermis, spire short, aper--ture very large. The whorls are rounded with a narrow, sloping shoulder, sculptured with equally spaced, low axial ribs and spiral cords, slightly nodulous at the intersections. The umbilicus is closed, the inner lip callous, and the columella has two oblique plaits near the proximal end. The measurements are given as, Length of shell 21.5, max. diameter 9.5 mm." (Strong).

Massyla (Aphera) io (Dall), 1896. San Diego, Calif. in 650 fathoms to Gulf of Panama in 322 fatgoms (Dall). Type locality, U.S. Fish Commission Sta. 3354, in 322 fathoms, Gulf of Panama.

Dall states, " This species has much the look of a gigant Admete, but without the arched pillar. Most of the specimens were eroded,and the species has a genuine abyssal aspect." The shell is fusiform, whitish or pink, sculptured with rather stout,rounded axial ribs crossed by numerous flatten--ed spiral threads. The columella has three plaits and the body of the shell a wide wash of callus. The measurementa of the type are given as, Height of shell 41, width of last whorl 21 mm. " (A.M. Strong).

Massyla (Aphera ?) microsoma (Dall),1908. North Coronado Island (656 fms.) to Acapulco,Mexico (660 fms.). Type locality, off Acapulco, Mexico in 660 fathoms.

" It is very difficult to place this minute, deep water species in any grouping of the family Cancellariidae and it may not belong in that family. Dall states in the original description, " This small species might be referred to Admete if it were not for the absence of concave arcuation of the pillar which is characteristic of that genus, and the presence of a small umbilical chink."

" The shell is thin with a brownish epidermis and tabulated whorls sculptured with a keel at the shoulder and spiral cords on the base, entire

surface with strong lines of growth. The columella has two plaits, the anterior of which forms the edge. The measurements of the type are given as, Long. of shell 3.5. max. diameter 1.8 mm." (A.M. Strong).

Genus Admete Kroyer in Moller,1842. Index. Moll. Groen.,1842, p.15. Type (by monotypy), Admete crispa Moller, which equals Tritonium viridulum Fabricius, Fauna. Groen.,1780, p. 402. (Moller in the text ascribes the genus Admete to Kroyer).

" As explained by Pilsbry (1) Admete crispa Moller is identical with Tritonium viridulum Fabricius of the north Atlantic fauna and is closely related to Admete couthouyi (Jay) which is circumboreal. Grant and Gale (2), following Dall, give Tritonium viridulum Fabricius as the type of the genus Lora in the family Turridae in which a large group of boreal species are placed. They state (3) that Admete crispa Moller is a minor variety of Admete couthouyi (Jay). Grant and Gale (4) bring the name "Lora" viridula Fabricius into the west coast literature by making Fusus fidicula Gould a synonym. The latter is a Puget Sound species and seems to be a true Turrid, similar in shape and sculpture to viridulum but lacking the characters of the columella of the genus Admete.

The genus Admete differs from all other groups placed in the family Cancellariidae in having the columella curved instead of straight, sharply, obliquely truncated without terminal plication and with one or more feeble plication on the upper portion, frequently not visible in the aperture. The shell is more or less turrited, without umbilicus, aperture oval,without a distinct canal, and the sculpture is fine and reticulate. There may be some question in regard to placing this arctic genus in Cancellariidae as the type is said to lack an operculum and the radula to be without teeth" (A.M. Strong).

(1). Nautilus, vol.51, No.4,1938, pp. 115-118.
(2). Mem. San Diego Soc. Nat. Hist. vol.1,1931,p. 512.
(3) Loc. cit. p. 622
(4) Loc. cit., p. 514

Admete couthouyi (Jay),1839. Arctic Sea to San Diego, Calif. Circumboreal. (Dall). Johnson lists it on the Atlantic coast from Labrador to Massachusetts. Type locality, Massachusetts Bay.

" Dall in 1921 seems to have been the first to introduce the name into west coast literature. The species is not uncommon along the Alaskan coast. On the New England coast it has been taken at various depths, one record being that of Albatross Sta. 2115, in 843 fms. The San Diego record, if not a misidentification, must have been from some such depth. On both coasts the shell is quite variable in strength of sculpture, amount of tabulation to the whorls and presence or absence of plications on the columella.

It was originally described as shell,ovate, somewhat turrited, white, sculptured with distinct lines of growth, sometimes rising into folds near the sutures, and coarse spiral threads. The measurements are given as, Length 11/20, breadth 7/20 in. (approximately 12 x 9 mm)." (A.M. Strong).

Grant and Gale, 1931, p. 622 were disposed to consider this a very variable species and lump a number of species under it including middendorffiana, gracilior, etc. Obviously we are not following them in this conclusion.

Collecting data: Ketchikan, Alaska in 25 fms. (G. Willett); Izhut Bay, Afognak Island, Alaska,1922 and Drier Bay, Knight Island, Prince William Sound, Alaska 1923 (W.J. Eyerdam); Monterey Bay: 45 fathoms off Santa Cruz, and 52-59 fathoms off Point Pinos, in green mus; rare (A.G. Smith); Puget

Sound (Trevor Kincaid).

Admete couthouyi laevior Leche,1878. Arctic Ocean to Sea Lion Rock, Wash. (Dall). and off San Juan Island, Puget Sound.

Dr. A. Myra Keen gives the following data : " Admete viridula laevior Leche,1878. This is based on figures in Middendorff's Beitrage zu einer Malacologia Rossica, vol.2,1848, pl.9, figs. 13,14 and pl. 10, figs. 1-2. The specimen in figs. 13-14 is from the Bering Sea (dimensions: height 20 mm., diam. 11 mm); the specimen in figs. 1-2 is from Lappland. Therefore the type locality is not specified."

The reference for the description is : Konlige Svenska Akademis Handlingera, vol.16,1878, p.43. " Arctic".

" This variety seems to be unfigured. It is described as, shell larger than the typical, smoother; suture not as distinct; whorls rounded. The measurements are given as Long. 22½, lat. 11½ mm." (A.M. Strong).

The variety is also figured in Tryon, vol.7, pl.7, fig.28. However, Tryon does not list it from the west coast.

Collecting data: Forrester Island, Alaska in 50 fms. (G. Willett);

Admete couthouyi undata Leche,1878. Arctic Ocean to Forrester Island, Alaska (Willett). Type locality, Greenland.

Dr. A. Myra Keen gives the following data: " Admete viridula undata Leche,1878 (Kongl. Svenska Vetenskaps-Akadiemiens Handlingar, vol.16, no.2, p. 47). This is based on Middendorff's Beitrage, pl. 10, figs. 3-4, type locality Greenland. Dimensions, height 16 mm., diam. 9 mm."

This subspecies is also figured in Tryon, vol.7, pl.7, fig.27. It has not been listed from the west coast.

Collecting data: Ketchikan, Alaska in 30 fms. (G. Willett); Drier Bay,Alaska (Eyerdam) (Strong).

Admete middendorffiana Dall,1884. Arctic Ocean to Bristol Bay, Bering Sea.(Dall). Type locality, Nunivak Island, Arctic (fide Oldroyd).

" Dall states " This form is perfectly distinct from A. viridula, and may prove to be a Cancellaria. Grant and Gale, under A. couthouyi state, " The form middendorffiana Dall, is a low spired variation." The figure shows a broadly ovate shell with a nearly straight columella and indistinct plaits, sculptured with fine spiral threads and lines of growth which form short axial ribs for a narrow space below the suture. The measurements are given on the list of plates as, Altitude 17.5 mm." (Strong).

Admete regina Dall,1911. Arctic Sea to Pribilof Islands (Dall). Type locality, Plover Bay, Bering Sea in 25 fms.

" ... is described as having a deep, narrow umbilicus and the columella with six or more feeble plaits. It seems to be unfigured, but the characters above would bar it from the genus Admete and it probably does not belong in the family Cancellariidae" (A.M. Strong).

Family OLIVIDAE

Genus Oliva Martyn,1786. Type (by subsequent designation, Dall,1905), Oliva cortioata Martyn,1786, " Coasts of Guinwa"(?), -- O, incrassata Solander (O. angulata Lamarck, fide Dillwyn..." (Grantand Gale,1931, p.623.

" Shell ovate-cylindrical, smooth, polished, spire low, suture chameled; aperture long, narrow, emarginate anteriorly, channeled posteriorly; outer lip sometimes thickened, parietal wall covered with callus, marked by fine plaits; operculum and epidermis lacking."

Oliva is distinguished from Olivella by its larger average size, lower spire, more elongate aperture, and lack of operculum" Grant and Gale.

The genus Oliva is not represented in the California fauna, but there are a number of west coast species in the southern provinces. The following list of species will be followed by Mr. A.M. Strong's key to species.

Oliva spicata Bolten,1798/	(Lower Calif. to Panama)
variety polpasta Duclos,1840	
variety fuscata Morrat,1870	
variety oniska Duclos	
variety cumingia Reeve	
variety intertincta Carpenter	
variety pindarina Duclos	
variety hemphilli Stearns	
Oliva incrassata Solander,1786	(Magdalena Bay to Peru)
Oliva hiatula Duclos	(Gulf of California to Chile)
Oliva porphyria Lamarck	(Gulf of Calif. to Panama)
Oliva splendidula Sowerby	(Gulf of Calif. to Panama)
Oliva julieta Duclos,1835	(Gulf of Calif. to Peru)
Oliva peruviana Lamarck,1810	(Panama to Peru)

Key to species of the genus Oliva on the west coast

Shell large, operculum absent
. Columellar plaits only showing toward the base
.. Body whorl slightly contracted and angulated at shoulder
... Painted with dotted or dashed zigzag chestnut lines
50 mm. Panama to Chile .... peruviana
Tryon 5, p. 74 Reeve, pl. 9, fig. 14
. Columellar plaits numerous but short and indistinct
.. Upper part of body whorl contracted, lip waved
... Densely painted with a network of reddish lines
50 mm Scammon Lagoon to Panama .... spicata
Tryon, vol.5, pl.27, fig.62. Reeve pl.10, 8h,16b
.. Upper part of body whorl more or less swollen
... Spotted and angularly streaked with olive
80 mm Lower Calif. to Peru .... incrassata
Tryon 5, p. 82. Reeve, pl. 1 , fig. 1.
... Profusely painted with large blackish spots
Gulf of Calif. to Peru .... julieta
Reeve pl. 9, fig. 15.
.. Shell evenly, cylindrically oblong
... Mottled and lined with reddish in 2 obscure bands
100 mm. Gulf of Calif. to Panama .... porphyria
Tryon 5, p. 74. Reeve, pl.1, fig.2.
. Columellar plaits strong and distant
.. Shell fusiformly ovate
... Faintly clouded or angularly streaked with brown
60 mm Gulf of Calif. to Chile .... hiatula
Tryon 5, p 88 Reeve, pl. 18, fig. 35

•• Shell cylindrically oblong
••• Two bands of interrupted triangular brown markings
50 mm Lower Calif. to Panama .... splendidula
Tryon p 74 Reeve, pl.11, fig. 17

Genus Olivella Swainson,1831. Type (by subsequent designation,Dall, 1909), Oliva purpurata Swainson -- O. dama (Wood). Fide Grant & Gale,p. 625.

The genus Olivella has a horny operculum which distinguishes it from Oliva.

The following list of species covering the entire west coast will be followed by Mr. A.M. Strong's key to the species. We will then take up a more detailed discussion of the species reported from San Diego northward.

Olivella biplicata Sowerby,1825. (Vancouver to Magdalena Bay)
Olivella baetica Carpenter,1864. (Aleutians to Cape San Lucas)
Olivella porteri Dall,1910. (Redondo to Magdalena Bay)
Olivella pedroana Conrad,1855 - pycna Berry,1935. (Puget Snd. to Cape San Lucas).
Olivella petiolita Duclos. (Newport to Gulf of California)
Olivella dama Mawe in Wood,1828. (Gulf of Calif.)
Olivella tergina Duclos, (Magdalena Bay to Peru)
Olivella myriadina Duclos,1835. (Gulf of Calif. to Panama)
Olivella undatella Lamarck,1810. (Gulf of Calif. to Panama)
Olivella zonalis Lamarck,1810 (Gulf of Calif. to Peru)
Olivella gracilis (Sowerby),1829 (Gulf of Calif. to Panama)
Olivella semistriata Gray,1839. (Gulf of Calif. to Peru)
Olivella kaleontina Duclos,1835. (Gulf of Calif. to Peru)
Olivella anazora Duclos (Gulf of Calif.)
Olivella volutella Lamarck,1810. (Gulf of Calif. to Peru)
Olivella zonoeta Duclos (Gulf of Calif.)
Olivella tehuelcha Duclos (Tres Marias Islands to Panama)
Olivella versicolor Mawe. (Central America)
Olivella salinasensis Bartsch,1928. (Ecuador)
Olivella quayaquilensis Bartsch,1928. (Ecuador)
Olivella columellaris Sowerby,1825. (Central America to Peru)

Key to species of west coast Olivella

Columella smooth except for a terminal spiral plication
• Plication cut by one or two incised spiral lines .... biplicata
• Plication smooth, rounded
•• Surface of body whorl smooth
••• Body whorl broad, with a short spire .... pycna Berry
••• Body whorl slender, spire elevated
•••• Shell very small, pure white .... myriadina Duclos
•••• Shell not pure white
••••• Columella white, colors variable .... baetica Carp.
••••• Columella chestnut on upper part, colors banded ...... zonalis Lamarck
•• Surface of body whorl finely sculptured
••• Fine spiral striations on lower part of body whorl...... semistriata
••• Fine axial ribs on upper part of body whorl .... columellaris
Columella with numerous plications
• Plications in a graded series,stronger toward the base
•• Shell slender, fusiform, columella white .... gracilis B. & S.
•• Shell oblong, body whorl broad
••• Spire elevated, columella purplish .... dama Mawe

... Spire blunt, columella bluish white .... tergina Duclos
. Plications not in a graded series
.. Plications divided into two groups
... Basal group of plications 4, upper numerous ..... undatella Lamarck
... Both basal and upper groups of plications numerous. anazora Duclos
.. Plications all basal, strong .... volutella Lamarck

Several species listed are not included in the key. Some are of very doubtful standing. In others the columella plications are not described. If the characters of the plications are constant for the species and they seem to be, it makes an easy way to divide the species into several main groups.

Another key to west coast species of Olivella

Shell smaller, operculum present .... Genus Olivella
. Columella smooth, ending in a single plication
.. Shell elliptical, basal plication strong
Puget Sound to Cape San Lucas .... pycna
.. Shell oblong, basal plication obscure
... Ivory white, semi-pellucid
4 mm Gulf of Calif. to Panama .... myriadina
Tryon 5, p. 68
.. Shell ovate, rather swollen above the middle
... White, with 3 spiral chestnut bands
6 mm Tryon 5,p.67. Reeve pl.29,fig.91. Gulf of Calif. to Peru .... zonalis
.. Shell ovate, base broad and truncated .
... Posterior half of last whorl spirally striated
.... Grayish, with a yellowish spiral band
Gulf of California to Peru .... semistriata
Tryon 5, p. 67. Reeve pl. 20, fig. 61.
... Anterior half of last whorl axially striated
.... Bluish, with 2 narrow yellowish spiral bands
15 mm Panama to Peru .... columellaris
Tryon 5, p. 67. Reeve, pl.23, fig.22
. Columella ending in a double plication
.. Shell short ovate, stout
... Bluish or grayish, usually unicolor
25 mm. British Columbia to San Diego .... biplicata
.. Shell oblong, spire sharp pointed
...Grayish or drab, unicolor or with darker maculations
20 mm. Alaska to Cape San Lucas .... baetica
... Yellowish, blotched or lined in tent-like patterns
15 mm Redondo to Magdalena Bay .... porteri
. Plications numerous, increasing in size toward the base
.. Shell slender, fusiform
... Whitish, with irregular darker reticulations
20 mm Gulf of Calif. to Panama .... gracilis
Tryon 5, p. 78. Reeve pl.20, fig.46
.. Shell oblong-cylindrical
... Purplish, variegated and spotted with reddish
33 mm Gulf of Calif. to Peru .... kaleontina
Tryon 5, p.86. Reeve, pl.20, fig.49.
.. Shell oblong
... Spire long and tapering
.... Whitish,sutural band of brown lines, then reticulated
25 mm Tryon 5,p.71, Reeve pl 23,f.63. Gulf of Calif. dama

... Spire moderate, sharp pointed
.... Purplish, subsutural bandand reticulations chestnut
18 mm Tryon 5 p. 66 Gulf of California .... petiolita
... Spire blunt and swollen
.... Yellowish, reticulated with brown
15 mm. Gulf of Calif. to Peru .... tergina
Tryon 5, p.66 Reeve pl.26, fig.80
. Plications divided into two groups
.. Shell cylindrically ovate, spire rather short
... Whitish, zigzag brown lines in two bands
20 mm Gulf of Calif. to Panama .... undatella
Reeve pl. 25, fig. 73 Tryon 5, p. 70
.. Shell oblong, spire moderate
... Whitish, with waved brown axial lines
18 mm Gulf of California .... anazora
Reeve pl.25, fig.74.
. Columella ending in a group of strong plications
.. Colors variable, unicolor or faintly axially lined
30 mm Gulf of Calif. to Peru .... volutella
Tryon 5, p. 73. Reeve, pl.21, fig.54.

Olivella biplicata(Sowerby)1825 Vancouver Island, B.C. to Magdalena Bay, L.C. (Dall). Type locality " West coast of North America".

This is our common stout heavy shell species. Among the many color varieties described are the following: angelina T.S. Oldroyd,1921; fucana T.S. Oldroyd,1921; lapillus Vanatta,1915; parva T.S. Oldroyd,1920. These subspecies have been generally placed in the synonymy of the typical. If any of these are valid the range extensions would cover the range of the typical. Dr. D.S. and E.W. Gifford have contributed several very fine papers that should be consulted by those interested in the color forms of this species- " Color variation in Olivella biplicata", Nautilus, vol.55, no.1, p. 10- " Color variation in Olivella biplicata in various localities" Nautilus vol. 56, p. 43- " Californian Olivellas" Nautilus vol.57, p. 73.

The consensus of opinion is that while there may be local races of this species that retain rather consistently their minor variations in their particular locality, they are, nevertheless of no real importance. However, there are opinions on the other side from many careful students. Dr. Joshua L. Baily Jr. states (Per. Comm. April,1945) " The varieties angelina and lapillus I believe to be legitimate. Angelina I take to be an obvious typographical error for angelena. The other two varieties I am not familiar with. Lapillus is the white color variety which had already been given another name which has no standing because it was published without a description. I believe Mrs. Williamson called it alba . .. Angelena is the common form. The typical form is the heavy coarse looking form from the north, and is quite distinct... I believe that Mrs. Williamson also used the varietal name brunnea, also without description. It is a name of no value, but for the sake of completeness it might as well be mentioned in your notes. Mr. Vanatta was of course familiar with it, and the fact that he published a name for alba but not for brunnea shows that he considered the latter name of no importance. The only really brown olives I have ever seen have been dead specimens. Some day I would like to make a biometrical study of all the olives on this coast.." Walter J. Eyerdam reports O.b. fucana T.S. Oldroyd,1921 from Straitm of Fuca, Wash. Dr. D.S. and E.W. Gifford state (Per. Comm. April,1945) " We really have little to add to the opinions expressed in our articles in " The Nautilus". As you may judge by these, we regard certain forms of biplicata described under separate

names as probably falling within the range of individual variation rather than being true subspecies. "

Collecting data: The species seems to be seasonably abundant in certain places. For example it is possible to collect them by the bushel if desired in Morro Bay and other lagoons during the months of June, July, and August. They are almost always present but apparently not in such large numbers. The habitat is just beneath the surface of the sand. They may be easily detected by the trail they leave. With a large screenand spade it is possible to collect great numbers in a very short time. Our experience has been to find them a common species from Monterey to Todos Santos Bay and in almost all possible habitats. We have takenthem on sandy beaches along the open sea, in rocky rubble and in algae, in muddy lagoons, and the bathymetric range is of some interest. We picked this species up in our dredged in at least 20 fathoms off Monterey, in 25 fathoms off Redondo Beach, and from shale, sand and gravel bottoms. (Burch); Monterey Bay (Hemphill); Avila, Calif. (Wilcox); Bolinas, Calif. (Gifford); Morro Bay and San Pedro (Lowe); San Diego and Point Loma (Bristol); La Jolla (Bristol); San Diego Bay (Hemphill); " I have taken fine specimens at Duxbury Reef, near Bolinas" (A.G. Smith).

Olivella baetica Carpenter,1864. Kodiak Island, Alaska to Cape San Lucas (Dall). Type locality not specified according to Dr. A. Myra Keen. Mrs . Oldroyd stated that it was San Diego.

There has been some confusion about this species. A number of subspecies have been d escribed and other species placed in the synonymy. O. b. diegensis T.S. Oldroyd ,1921 and O. b. mexicana T.S. Oldroyd,1921, have been very generally placed in the synonymy of the typical. The consensus of opinion is to place Olivella porteri Dall,1910 in the synonymy of this species. We have topotypes from San Diego, the type locality of porteri and other sets so labelled. The late Dr. Fred Baker considered it a good species. Grantand Gale consider it a valid subspecies of baetica. However, the opinions of the majority is well stated by the terse note of Mr. George Willett " I think porteri is a variant of baetica of no taxonomic importance." Mr. A.G. Smith comments " My recommendation would be to drop porteri into the synonymy of baetica. Packard's report of porteri from San Francisco Bay undoubtedly refers to O. pycna Berry."

Dr. Joshua L. Baily Jr. makes some interesting comments (Per. Comm . April,1945) " Olivella baetica. Frequently misspelled boetica, because the edition of Carpenter's work in which the name was first proposed used a type in which the combination of letters that were united in a single character made the a look more like an o. If this be compared with the termination -idae in the same work it will readily be seen that Carpenter spelled the name baetica. When Keep brought out the first edition of West Coast Shells he believed that all forms of Olivella s.s. from our coast could be retained in a single species and so it wasnt a matter of great importance which form he figured. I believe now that what he figured as baetica is really porteri but I did not think so when I prepared the revised text. The typical baetica I believe is the one figured by Mrs. Williamson in Proc. U.S.N.M. v. 15 in 1892. If all specimens were as distinct as these two cuts there would be no doubt that they are good species. In my collection theyare pretty distinct but I cannot separate them in Dr. Berry's collection and I doubt if porteri is anything more than a place-mode of baetica. The name is in the literature and perhaps we will find it necessary to keep it but I doubt if it is even a good subspecies."

Olivella pedroana (Conrad),1855 is a nother specific name confused with this species, and with the following species pycna Berry. D.S. and

E.W. Gifford comment on these as follows (Per. Comm. April,1945) " As to the smaller species, pycna and pedroana seem distinct. We regard pedroana and baetica as merely two names for one species, and of course, pedroana has priority. We have not seen intorta and porteri , but would not be surprised if they fell within the limits of variation of pycna and (or) pedroana. "

Collecting data: The habitat of this species is very general. We have taken it in great numbers at certain seasons in the lagoons. In June and also in October we recorded it as being very abundant inside the Estero below Ensenada,Mexico, but it seems difficult to state a season of the year for it because we have found it in vast numbers for example at San Onofre, Calif. in the rubble reef and sand in November, and in almost unlimited numbers on the sandy beaches between Long Beachand Seal Beach in Jan. and Feb. It is a common dredged shell. Our experience being being to bring it up from as deep as 40 fms. off Monterey (but more abundant around 20 fms.), Redondo Beach and also off Avalon, Catalina Island in 25 fms. and less, San Pedro, Calif. in 20 fms., Ensenada,Mexico in 15 fms. (Burch); Southeastern Alaska, north to Sitka, 15-20 fms. (G. Willett);"Also we collected in November a large series of pedroana (or, as you call it,baetica) in the Estero below Ensenada, to which place you kindly directed us." (Gifford); Izhut Bay, Afognak Id., 1922 in 10 fms. sandy mud and also Drier Bay,Knight Island,1923 in 15 fms. sandy mud (W.J. Eyerdam); Hinchinbrook Island,Alaska (Norberg) (Eyerdam); " As you go north this species gets bigger, apparently reaching the maximum size in Alaska. The Monterey form, as you know, is a relatively small one. The most southern record for a large specimen is a single one dredged in 50 fathoms on Cordell Bank, 18.4 mm. in length. The lengths of a lot from Alaska range from 15.4 to 21.6 mm. (A.G. Smith); San Diego (Fred Baker); San Diego Bay (Hemphill); La Jolla (Bristol); Jefferson Point, Puget Sound (H.N. Lowe). As O. porteri- San Diego Bay (Lowe); San Diego (Dr. Fred Baker); So. Coronado Island, 6-15 fms. (Dr. Fred Baker); San Benito Island, Lower Calif. in 10 fms. (Lowe).

Olivella pycna Berry,1935. Proc. Malac. Soc. London, vol.21, no.4 (1935), pp 262-65, 1 fig. in text. Port Orford, Oregon south to Morro Rock, San Luis Obispo Co. (Burch). Type locality: Bolinas Bay, Calif. in 3-4 fms.

" Shell small,heavy,elongate-nuciform, widest near the middle, the spire tapering almost straightly to an acute point; anterior extremity truncate. Whorls seven, their slopes nearly straight on the spire, the body whorl large and strongly convex. Suture sharply, narrowly, and deeply channelled. Aperture about three-fifths the length of the shell, the outer lip sharp and distinctly arcuate, its obtuse anterior lobe slightly exceeding the columella anteriorly past the short notch like canal. Parietal wall covered by a strong white callus, heaviest and of greatest extent posteriorly where it rounds rather abruptly to pass under the free and overhanging outer lip just in front of the sutural channel, the parietal callus not passing the suture but confluent in the channel with a second low callus just posterior, developed as the termination of a low calloused band which bounds the channel posteriorly and covers about a third of the adjoining whorl before its gradual and final dissapearance. Columellar fold moderately heavy, usually distinctly duplex but sometimes single, the columellar and extreme anterior region covered by a third white callus which is overlain near the aperture of the parietal callus. Surface smooth, lustrous under magnification seen to be very finely and closely covered with minute wavy spirals on the uncalloused portions which are again minutely decussated by the numerous fine lines of growth. Parietal callus minutely punctate.

Colour light brownish buff (usually quite near Tilleul Buff), clouded

brownish, though usually with a rather wide buff spiral band persisting below the suture , the whole conspicuously ornamented by numerous highly irregular wavy stripes of Fawn Colour or Army Brown, with occasional suffusion of Light Vinaceous Drab; interior, except the buff lip-margin, Walnut Brown to Cameo Brown; callous portions white as noted." Measurements of the holotype are given, Long. 13.6 mm; max. diam. 7.5; outer lip, 8.4; whorls 7.

Dr. Berry discusses the problems connected with pedroana dnd intorta at length. Dr. Joshua L. Baily Jr. states our problems very clearly as follows (Per. Comm. April,1945) " Olivella pycna. When Dr. Berry described this species he made it clear that he was not describing a new species but only giving a new name to an old species because he was doubtful as to the validity of the two names by which it was already known. I have never seen the type of pedroana Conrad but I understand that it is a fossil and that it is broken, which is probably why Dall thought it was identical with baetica at one time and with intorta at another. Unfortunately the name pedroana is the oldest name applied to either of our two species of Olivella s.s. and it must be used for one of them. My personal feeling is that since so many people have held opinions at one time which conflict with the opinions held by the same people at othertimes it is clear that the type is too badly damaged for identification and that the species should be omitted altogether on the ground that the name is a nomen nudum. Dr. Bartsch would not commit himself as to what it might be, but would only say that he thought it was the sameas interta. This was before Berry had published pycna. As for the name intorta, this was originally given to a Gulf of California species. Whethor it was the same as our California species I do not know. It is not impossible that intorta was at one time a widely distributed species that has since become extinct in the middle of the range leaving two geographically distinct habitats. This is the case with Trivia solandri which is found in the northern part of the Gulf but not in the southern part, and also on the coast of the ocean. But it is not likely that this is the case, and therefore it is somewhat doubtful if the name belongs to our Olivella, Therefore I think Berry did quite right in renaming it, and I prefer to use his name because it is the first name to be applied to it which is beyond all possibility of doubt. All shells from our coast which have been labelled intorta are almost certainly pycna. But pedroana is something os a mystery. Dr. Bartsch suggested that it might be a place-mode of intorta. Probably he is right ."

Mr. A.G. Smith states his opinions on this problem as follows (Por. Comm. April,1945) " O. pedroana. I agree with Berry that this is unidentifiable without access to the type, which is lost. For a long time I have had the feeling that O. pycna may be the same as pedroana. This point might be settled if some of you southern California fossil collectors discover specimens with enough color left on them to show whether they have the peculiar zig-zag markings of pycha. I have seen plenty of fossil specimens that agree with pycna in shape. With respect to the small Olivellas I agree that Berry is the one to follow, although the last word may not have been said on the problem. It is quite possible that a good case may be made out for calling the large northern form of O. baetica at least a new subspecies on the basis of size and color markings, especially on the upper portion of the body whorl. My experience with baetica from southern California bays, such as Newport and Mission, is that the colors generally tend to be darker on shells freshly collected. The colors tend to fade after having been in the cabinet for awhile."

Mr. George Willett states " This is probably Conrad's pedroana , but he gave no description and I agree with Berry that his figure is not identifiable."

Mr. A.M. Strong stated an opinion on the Olivella pedroana (Conrad) matters as follows: " Dall changed his mind several times in regard to the use of this name but never gave his reasons so we do not know what he considered to be the true characters..Berry in the Nautilus listed a shell from Bolinas Bay as the true O. pedroana. I have specimens from this lot that he gave me. Later, Proc. Mal. Soc. vol. 21, pt.4, p.262, he described a new species. Olivella pycna, using as a type a specimen from this lot. This is a rather short, stumpy shell with but a single fold on the columella. This shell has been taken at Monterey and lately at Morro Bay, and seems to be quite rare. I would be inclined to take Berry's first opinion."

Collecting data: Collected several hundred specimens off Morro Rock at the entrance to Morro Bay, San Luis Obispo Co. in January,1937, and dredged a number of specimens off Pacific Grove, Calif. in 15 fms. (Burch); Princeton, San Mateo County, and at Stinson Beach, Marin Co. (Gifford); Bolinas Bay 3-4 fms. (Weymouth); S. side Tamales Bay, Hog Is. (Williams)

Olivella intorta Carpenter,1856. Proc. Zool. Soc. London for 1856,p.207.

" O.t. parva,ovoidea, subtumente; sutura vix sulcate; albido-grisea, fascia indistincta subsuturali olivacea,flammulis et maculis purpureo-fuscis plus minusve ornata; apertura antice aperta, postice angusta; callositate parietali ad suturam penultimam producta; columella maxime intorta, plica ad basin acuta, in pariete duabus saepe indistinctis; extus, linea spirali antica unica."

Long. .52. long. spir. .17, lat. .26, div. 60 deg.

Hab. San Juan; legit Dr. Green. Mus. Gould. Item, loc. incert. Mus Cuming.

A well marked species, resembling the West Indian O. bullata , on a much larger scale. The specimens vary in tumidity and height of spire. The parietal callosity extending over the penultimate whirl hides the colour of the spire."

Thanks to Dr. Leo Hertlein for sending us the above copy of the original description of intorta. This specific name is of particular interest because of the very common belief that this species, pedroana and pycna are perhaps identical. And there are countless sets of shells around with the label intorta and no one quite certain what it is.

Mr. A.M. Strong makes an interesting suggestion " I would rather expect it might be O. baetica mexicana Oldroyd. We should have almost everything in the shape of Olivellas from that territory."

Olivella petiolita Duclos. ? Newport, Calif. to Gulf of Calif. ?

It is not our intention to propose adding this species to the California fauna until we have had more information. Mr. George Willett has a set of shells from off Newport that may prove to be this species or perhaps a new species.

Genus Agaronia

Agaronia testacea Lamarck Gulf of California to Panama.

Genus Harpa

Harpa crenata Swainson,1822. Gulf of Calif. to Panama

Family MARGINELLIDAE

The following key is taken from Mr. A.M. Strong's notebook.

Shell with a visible spire
. Shell large, 3/4 inch or more in length .... Marginella
.. Spire low, indistinct .... (Prunum)
... Interior brownish, outer lip white .... sapotilla Hinds
... Interior orange tinted, outer lip edged with violet.. curta Sowerby
... Interior white, outer lip tinted with yellow ... albuminosa Dall
. Shell small, less than ½ inch in length
.. Outer surface with color markings
... Shell ovate or oblong................................ Persicula
.... Surface with half moon shaped spots in spiral rows
..... Spots concave to the right .... frumenta Sowerby
..... Spots concave to the left .... phrygia Sowerby
.... Surface with spiral series of interrupted, dark lines
..... Spiral lines tending to form a darker
peripheral band .... imbricata Hinds
..... Spiral lines tending to form two darker bands .. adamsiana P. & L.
.... Surface with spots and streaks elongated axially.. dubiosa Dall
.... Surface with square brown dots .... ? tessellata Lamarck
... Shell elongated, sides almost parallel .... Hyalina
.... Shell rather stout, colors distinct, banded ..... californica Tomlin
.... Shell more slender, color bands fainter .... parallela Dall
.. Shell pure white .... Cystiscus
... Length 4.5 mm. Ratio diam. to length 1 to 1.5....... jewettii Carp.
... Length 3.5 mm. Ratio diam. to length 1 to 1.27 ... subtrigona Carp.
... Length 3.25 mm.Ratio diam. to length 1 to 1.44 .. regularis Carp.
... Length 3.0 mm. Ratio diam. to length 1 to 2 ...... politulus Dall
... Length 3.3 mm. Ratio diam. to length 1 to 2.1 ... myrmecoon Dall
... Length 2.25 mm.Ratio diam. to length 1 to 1.6 .... minor C.B. Adams
... Length o.85 mm.Ratio diam. to length 1 to 1.55 .. polita Carpenter
Spire covered by an extension of the outer lip ..... Cypraeolina
. Shell very small, white, sometimes tinged with orange- pyriformis Carp .
. Shell smaller, lower end of aperture narrower .... margaritula Carp.

Marginella eremus Dall and M. anticlea Dall not included. I can find no genus in which to place them.

The following list of species covers the entire coast. We will then take up a more detailed discussion of the species ranging north of San Diego, Calif.

Genus MARGINELLA Lamarck,1799 Type, Voluta glabella Linnaeus.
Subgenus Prunum Herrmannsen,1852. Type M. prunum Gmelin.
Marginella (Prunum) curta Sowerby,1832. (Gulf of Calif. to Peru)
Marginella (Prunum) albuminosa Dall,1919. (West Mexico)
Marginella (Prunum) sapotilla Hinds,1844. (Panama to Peru)
Marginella (Prunum) marginata Born. (Panama, also Atlantic).
Genus Cystiscus Stimpson,1865. Type, C. capensis Stimpson.
Cystiscus jewettii (Carpenter),1865. (Monterey to Lower Calif.)
Cystiscus regularis (Carpenter),1865. (Monterey to Gulf of Calif.)
Cystiscus subtrigona (Carpenter),1865. (Monterey to San Diego)
Cystiscus politulus(Dall),1919. (Santa Barbara to Cape San Lucas)
Cystiscus minor (C.B. Adams),1852. (San Pedro to Panama)

Cystiscus politus (Carpenter),1857. (Gulf of Calif.)
Cystiscus anticlea(Dall),1919. (Galapagos)
Genus Persicula Schumacher,1817. Type, P. variabilis Schumacher
Persicula phrygia (Sowerby),1846. (Gulf of Calif. to Galapagos)
Persicula frumenta(Sowerby),1832. (Gulf of Calif. to Chile) — [illegible]
Persicula dubiosa (Dall),1871. (Gulf of Calif. to Acapulco)
Persicula imbricata (Hinds),1844. (Acapulco to Galapagos)
Persicula tessellata Lamarck (Central America to Panama)
Persicula rubella (C.B. Adams),1845. (Galapagos West Indies)
Persicula adamsiana (Pilsbry & Lowe),1932. (Panama Bay)
Marginella (Serrata) eremus Dall,1919. (Galapagos)
Genus Hyalina Schumacher,1817. Type, H. pellucida Schumacher.
Hyalina californica (Tomlin),1916. (San Pedro to Puerto Libertad)
Hyalina myrmecoon (Dall), 1919. (San Diego).
Genus Cypraeolina Cerulli-Irelli,1911. Type, Cryptospira clandestina Br.
Cypraeolina pyriformis (Carpenter),1865. (Alaska to Cape San Lucas)
Cypraeolina margaritula, (Carpenter),1857. (Gulf of Calif. to Panama).

Genus Hyalina Schumacher,1817. Type (by monotypy), H. pellucida Schumacher.

" Shell small; spire low or concealed by a callus wash or by the posterior margin of the aperture; outer lip simple or slightly thickened, without strong denticulations."

Hyalina californica (Tomlin),1916. Santa Monica Bay, Calif. (Burch) to Puerto Libertad, Mexico. Dr. A.M. Keen calls attention to the fact that the species was reported from the Galapagos by Stearns. Type locality, San Pedro, Calif.

This species is reported by earlier authors as M. varia Sowerby.

Dr. Joshua L. Baily Jr. comments on our changes in nomenclature as follows (Per. Comm. April,1945), " Hyalina californica. This name is something of a mystery to me. I believe the true varia is something different, or that Dr. Tomlin considered it so. I do not know what the true varia is. The name Hyalina is used for what formerly was called Volvarina Hinds. This may or may not have been the same as Volvaria Lamarck which is now placed in the Acteonidae. No one has ever published a synonymy of this complex of names to indicate why Hyalina should be used. We must take it on authoritarian grounds. And I do not know why Cystiscus and Cypraeolina should be made subgenera of Hyalina. To my mind they don't look enough aliko. I should consider calling them all subgenera of Marginella ."

Collecting data: Habitat in rocky rubble under stones at low tide line. It is not an uncommon little shell but it takes rather a low tide to collect them. We have taken them in numbers from Santa Monica Bay at Malaga Cove, Pt. Firmin,San Onofre, to Punta Banda, Mexico. The bathymetric range is not deep but we have brought them up in gravel as deep as 25 fms. off Catalina Island (Burch); Guaymas, Sonora,Mex.; Pta. Penasco,Mex.; Pta. Libertad, Sonora; La Paz; Angeles Bay; San Felipe,Mex.; Topolobampo; San Nicholas Island; San Pedro, Calif. (H.N. Lowe); La Jolla, Calif. (Bristol); San Diego (Kelsey)

The southern species or subspecies perhaps as it was described as Marginella californica parallela Dall may have some bearing on the range. Mr. A.M. Strong comments on it as follows: " The variety is smaller, even more slender, and much paler in color. There is a reference to M. varia Sby. in Proc. Wash. Ac. Sci. vol.4, p.555, which probably belongs here and the variety seems to be the southern form of the California species. It is also probable that some of the southern records listed should really be referred to the variety and it might be well to consider it a good species."

Genus Cystiscus Stimpson,1865. Type (by monotypy), Cystiscus capensis Stimpson -- (Marginella cystiscus Redfield). fide Grant & Gale " Shell small, ovate, aperture hardly reaching spire, which is very low and inconspicuous."

" This .. is a group intermediate between Hyalina with a definite spire and Cypraeolina with the spire concealed by the posterior margin of the elongated aperture" (Grant and Gale).

Mr. A.M. Strong states " These form a very distinct, closely related group on the west coast. They are very small with a low spire covered with a transparent callus. The color is pure white and they are highly polished. Dall says of them (Proc. U.S.N.M. vol.56, p.307) " The differences between these small Marginellas are not great but appear to be constant enough to take specific rank". The best way to distinguish them is by the size and the relative length and diameter."

Cystiscus jewettii (Carpenter),1857. Monterey, Calif. to San Martin Island, Lower Calif. (Baker). Type locality, Santa Barbara, Calif.

Collecting data: Rather common in dredgings off Monterey, Calif. in 20 fms. on shale bottom (Burch); San Pedro, washed in on shore (G. Willett from Tremper); St. Vincent, Calif. (Lowe).

Cystiscus subtrigona (Carpenter),1864. Monterey, Calif. to (Lat.27,Mex.) (Keen Check List). Type locality, Santa Barbara, Calif.

Collecting data: Dredged in 25 fms. off Redondo Beach, Calif. gravel bottom, taken littoral under the rocks at Bird Rock, San Diego Co. at low tide. Have sets from Dr. Fred Baker dredged off S. Coronado Island (Burch); beach drift at Pacific Grove, rare (A.G. Smith); San Pedro in 15 fms. (G. Willett); San Pedro, Calif.; Catalina Island, Calif. in 50 fms. (Lowe); La Jolla, Calif. (Bristol); San Diego Bay (Dr. Fred Baker and Hemphill); S. Coronado Island in 7-14 fms. and San Martin Island, L.C. (Dr. F. Baker).

Cystiscus regularis (Carpenter),1864. Monterey, Calif. to Gulf of Calif . Type locality, Santa Barbara, Calif.

Collecting data: From algae at Monterey, Calif. low tide on rocks, dredged off Avalon, Catalina Island, Calif. in 25 fms. , littoral on Bird Rock, San Diego Co. (Burch); Cayucos, Calif. in 10 fms. and Catalina Island in 30 fathoms (G. Willett); San Pedro, Calif. (Lowe); Monterey (Button); fairly common in Monterey Bay (A.G. Smith).

Cystiscus myrmecoon (Dall),1919. San Diego, Calif.

Mr. A.M. Strong thinks this is very close to politulus and may be identical.

Cystiscus politulus (Cooper MS) Dall, 1919. Santa Barbara, Calif. to Tres Marias Islands (Strong and Hertlein). Type locality, Catalina Island Calif.

Collecting data: Espiritu Santo Is., Gulf of Calif.; San Geronimo Is., L. Calif.; La Paz (H.N. Lowe).

Cystiscus minor (C.B. Adams),1852. San Pedro, Calif. to Panama. Type locality, Panama.

Collecting data: Bay of Panama (H.N. Lowe); San Diego Bay in 2 fms ., San Martin Island, L.C.; Scammons Lagoon, L.C.; S. Coronado Island in 7-14 fathoms (Dr. Fred Baker).

Genus Cypraeolina Cerulli-Irelli,1911. Type (by monotypy), Crypto--spira clandestina Brocchi. Merovia Dall,1920 is in the synonymy.

" Shell small, aperture lengthened posteriorly, margin covering the apex of the shell".

Cypraeolina pyriformis (Carpenter),1865. Izhut Bay, Alaska (Eyerdam) to Mazatlan, Mexico. Type locality, San Diego, Calif.

Collecting data: A very common shell the length of the coast in our collecting experience. Habitat connected with rocks or gravel probably i n the algae. Very abundant in algae around Monterey littoral although we brought it up in the dredgings in great numbers down as deep as 40 fms. although it was more abundant around 20 fms. Common in the gravel off Redondo Beach, Calif. in 25 fms. An odd little thing is that it is rather common on the backs of the large Haliotis rufescens brought into the markets at Monterey a nd Morro Bay. We have it f rom Puget Sound to Todos Santos Bay, Lower Calif. (Burch);

Izhut Bay, Afognak Island,1922, Elrington Id. and Drier Bay, Knight Id., Alaska,1923 and 1924, collected by W.J. Eyerdam. Mostly on nullipores at low tide. About one out of ten specimens are white instead of pink. Extended range northward 400 miles and westward 700; Ketchikan, Craig, Forrester Island, Alaska, littoral (G. Willett); Palos Verdes, Calif. (Lowe); Monterey (Lowe); N. Coronado Island (Frank Stephens); Ballast Point, San Diego (Kate Stephens); Bear Bay, Peril Strait, Alaska (Kate Stephens); Magdalena Bay (Orcutt)

Mr. A.M. Strong comments on Cypraeolina margaritula (Carpenter) " About the only way that this can be separated from C. pyriformis is by the smaller size and very slightly different shape. One is the northern and the southern form begins to appear somewhere around Cape San Lucas an and ranges to the Galapagos."

Family VOLUTIDAE

Genus Boroomelon Dall,1918. Proc. Biol. Soc. Wash. vol.31, p.137, 1918. Type, Scaphella stearnsii Dall,1872.

Dall described Boreomelon as a subgenus of Fulgoraria Schumacher, 1817. Maxwell Smith in " A Review of the Volutidae",1942 raised Boreomelon to generic standing. This sounds logical judging from the figures. I have not seen the species.

Boreomelon stearnsii (Dall),1872. " Shumagin Islands, Alaska and westward to Captain's Bay, Unalaska, in 40 to 100 fathoms, rocky and muddy bottom; also in Bering Sea northward to the line of floating ice in winter" (M. Smith). Type locality, Pribilof Islands, Alaska.

Boreomelon benthalis (Dall),1895. Gulf of Panama in 1672 fatgoms. This species was described as Scaphella by Dall and later in his " A Rev. of American Volutidae",1907 placed it in Adelomelon.

Genus Phenacoptygma Dall,1918. Type (by orig. desig.), Daphnella cortezi Dall,1908.

Phenacoptygma cortezi (Dall),1908. Off Cortez Bank in 984 fms. and off San Diego, Calif. in 639 fms. Type locality, off Cortez Bank.

Genus Adelomelon Dall,1906. Nautilus, vol.19, no.12, p.143. Type " Voluta" ancilla Solander.

Adelomelon magellanica (Lamarck),1811. This species is generally listed with a range of from Chile to Magellan Straits on this coast and from

Uruguay south on the other coast. Our interest in this species is that *Scaphella arnheimi* J.J. Rivers,1891, Proc. Calif. Acad. of Sci., 2nd Ser. 3,July 14,1891, is generally placed in the synonymy of *magellanica* and was described by Rivers as having been dredged in Monterey Bay. Dr. A.M. Keen advises " Dall in 1909, USGS Prof. Paper 59, bibliography, says concerning *Scaphella arnheimi*, " The shell is really from Magellan Strait." Somewhere else I remember reading a note to the effect that Rivers had mixed locality labels. The species should be deleted from our fauna.

Other species of the family Volutidae reported from the west coast south of San Diego follow:

Adelomelon ancilla (Solander),1786. (Chile to Magellan Straits)
Genus *Miomelon* Dall,1907.
Miomelon philippiana (Dall),1889. (Chile)
Genus *Enaeta* H. & A. Adams,1853.
Enaeta cumingii (Broderip),1832. (Peru to Magdalena Bay)
Enaeta barnesii (Gray),1825. (Cape San Lucas to Peru)
Enaeta pedersenii Verrill,1870. (La Paz, Mexico).
Genus *Tractolira* Dall,1895.
Tractolira sparta Dall,1895. (Gulf of Panama)
Genus *Calliotectum* Dall,1889.
Calliotectum vernicosum Dall,1889. (Off Ecuador and the Galapagos)

Family MITRIDAE

Genus Mitra Martyn,1784. Type (by subsequent designation, Dall, 1905), *Mitra tessellata* Martyn.

The question of the use of *Martyn* or of Lamarck,1799 is again presented. Dr. A. Myra Keen advises (Per. Comm.) " Until the International Zoological Commission rejects Martyn's names in their entirety, I believe we must adopt his generic names. It is to be hoped a decision will be forthcoming some time on both Martyn and Chemnitz."

Dr. Dall placed most of our species under the genus *Strigatella* Swainson,1840 and subgenus *Atrimitra* Dall,1918. The type of *Strigatella* is *Mitra zebra* Lamarck, a smooth, rather short species much like a Pyrene" fide Grant and Gale.

The following list of species covering the entire coast will be followed by Mr. A.M. Strong's key to species. We will then take up a detailed discussion of the species ranging from San Diego northward.

Mitra fultoni E.A. Smith,1892. (San Diego to Ballenas Lagoon)
Mitra idae Melville,1893. (Farallones to Cortez Bank)
Mitra mexicana Dall,1919. (Guaymas)
Mitra orientalis Martens,1897. (Ecuador to Chile)
Mitra swainsonii Broderip (Central America)
Mitra zaca Strong and Hertlein (Santa Maria Bay, L. Calif.)
Mitra catalinae Dall,1919 (Crescent City to Todos Santos Bay)
Mitra coronadoensis Baker & Spicer,1932. (Coronado Island)
Mitra diegensis Dall,1919. (Catalina to San Diego)
Mitra delorosa Dall,1903. (Gulf of California)
Mitra loweana Pilsbry,1931. (San Pedro to San Geronimo Id., L.C.)
Mitra salinasensis Bartsch,1928. (Ecuador)
Mitra attenuata Reeve,1844. (Acapulco to Panama)
Mitra crenata Swainson,1835. (Cape San Lucas to West Colombia)
Mitra effusa Swainson,1835. (Gulf of Calif. to Panama)
Mitra erythrogramma Tomlin,1931. (Corinto to Panama)
Mitra funiculata Reeve,1844. (Gulf of Calif. to Central America)

Mitra belcheri Hinds,1843. (Magdalena Bay to Central America)
Mitra lens Wood,1828. (Gulf of Calif. to Peru)
Mitra tristis Swainson,1835. (Gulf of Calif. to Peru)
Mitra gratiosa Reeve,1845. (Galapagos)
Mitra marshalli Bartsch,1931. (Panama)
Mitra orcutti Dall,1920. (San Diego)
Mitra solitaria C.B. Adams,1852. (San Diego to Panama)

Key to west coast species of Mitra

Sculpture of fine incised lines or threads only
. Shell large, over 2 inches in length
.. Whorls somewhat shouldered
San Diego to West Mexico .... fultoni E.A. Smith
.. Whorls not shouldered
... Fine axial sculpture present
85 x 25 mm. Central America .... swainsonii Broderip
... All axial sculpture absent
.... Spiral sculpture of fine threads
72 x 24 mm. Gulf of California ...... mexicana Dall
.... Spiral sculpture of incised lines
..... Incised lines distinct
...... Incised lines punctate
56 x 19 mm Farallones to Cortez Bank ..... idae Melville
...... Incised lines not punctate
56 x 22 mm Peru and Chile .... orientalis Gray
..... Incised lines indistinct
132 x 36 mm Gulf of Calif. .... zaca,Strong,Hanna,Hertlein
. Shell smaller, about 1 inch or less in length
.. Spiral sculpture of fine incised lines only
... Incised lines over entire surface
5.5 x 2.5 mm Catalina Island .... loweana Pilsbry
... Incised lines not over entire surface
.... Incised lines confined to a subsututal band
19 x Gulf of California .... dolorosa Dall
.... Incised lines becoming obsolete on last whorl
30 x 11 mm Crescent City to Todos Santos Bay.. catalinae Dall
.. Spiral sculpture of incised lines and fine threads
... Base with increasingly strong threads
27.8 x 12.7 mm Ecuador .... salinasensis Bartsch
... Base smooth, spiral threads in a subsutural band
14 x mm Catalina to San Diego .... diegensis Dall
13 mm x 6.25 mm Los Coronados Islands .... coronadoensis Baker & Spicer

Sculpture of more than incised lines or fine threads
. Axial sculpture very fine or absent
.. Spiral sculpture of sharp cords or keels
... Keels alternating in strength
30 x 10 mm Gulf of Calif. to Central America .... effusa Swainson
... Keels of equal strength
.... Interspaces between keels smooth
60 x 20 mm Gulf of Calif. to Panama .... funiculata Reeve
Sculpture of more than incised lines or fine threads-
. Axial sculpture very fine or absent
.. Spiral sculpture of sharp cords or keels
... Keels of equal strength
.... Interspaces between keels axially threaded
..... Shell slender, attenuated
36 x 9 mm Acapulco to Panama attenuata Reeve

..... Shell stout, fusiform
25 x 9 mm Corinto to Panama .... *erythrogramma* Tomlin
. Axial sculpture present
.. Spiral sculpture of incised lines
... Surface pitted at the middle of the whorls
65 x 25 mm Gulf of Calif. to Peru .... *lens* Wood
... Surface not pitted
.... Axial ribs distinct, cut by the spiral lines
110 x 30 mm Magdalena Bay to Central America .. *belcheri* Hinds
.... Axial ribs and spiral lines indistinct
30 x 14 mm Gulf of Calif. to Peru .... *tristis* Broderip
.. Spiral sculpture of raised cords
... Shell elongate-ovate
.... Axial ribs extending to the canal
14.3 x 6 mm Panama Bay .... *marshalli* Bartsch
.... Axial ribs becoming obsolete anteriorly
..... Columellar plaits four
17.5 x 4.5 Point Loma to Panama .... *solitaria* C.B. Adams
..... Columellar plaits two
5.6 x 2.7 mm La Jolla .... *orcutti* Dall
... Shell subcylindrical, slender
15 x 5 mm Galapagos .... *gratiosa* Reeve

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Mitra idae Melville, 1893. Farallone Islands to San Diego and Cortex Bank, Calif. Type locality, Point Loma, San Diego Co., Calif.

This is the North American analogue of the South American *orientalis*. Mr. A.M. Strong comments on these as follows: " The most distinctive character by which this differs from *M. orientalis* is that the spiral striations are minutely punctate and absent from the subsutural region. It has a black similar thick epidermis."

Collecting data: This is a very shallow water species at least in its typical form. We have dredged a few of them but none deeper than 10 fms. minus. We have taken it from rocky localities such as Point Firmin, fine specimens from the breakwater at San Pedro, the rocky rubble at Point Loma, below La Jolla (Burch); Point Loma (Dr. Fred Baker); San Pedro (H.N. Lowe); Cayucos in 10 fms. (G. Willett).

Mitra montereyi Berry, 1920. Monterey to San Diego, Calif. Type locality, off Del Monte, Monterey, Calif. in 12 fathoms.

This was described and generally listed as a subspecies of *M. idae*. In the preliminary discussions of this species the following remarks were made by J.Q. Burch " The species I know as *montereyi* is not only of an entirely different shape but the aperture is far longer in proportion to the shell than in *M. idae*. With the books full of species we all admit classifying with the aid of an atlas why quibble about obviously different ones ? We have dredged it in 20 to 40 fathoms off Monterey and also have dredged a species off Redondo Beach that must be very close to this species if not identical. We figure both species. Perhaps further study may show our shells to be another species still more robust than *montereyi*. The Redondo specimens are not uncommon in 75 to 100 fathoms."

Mr. A.G. Smith writes " Agree with you that it is a good species. My most southern record is 2 specimens from 10 fms. near Cayucos. "

Dr. Joshua L. Baily Jr. comments as follows " You are quite right. This is a very distinct form. I have recently been studying the land snail *Polygyra cereolus* which has several quite distinct varieties which have never been named, and several others which to me look exactly alike to which a multiplicity of names have been given."

Mitra catalinae(Dall)1919. Crescent City, Calif. to Todos Santos Bay, Lower Calif. (Burch). Type locality, San Pedro, Calif.

Grant and Gale suggest that this species may be but the young of M. idae, but we have young idae from numerous localities and certainly the species we call catalinae is quite distinct. It is one of the really common small species in the dredgings off Redondo Beach, Calif. in the gravel near 25 fathoms. The species is so common that after the first half gallon or so we quit taking them out of the dredgings. We have never seen a specimen exceeding one inch in length. In fact, one inch is a large specimen in our experience. We found it very common in the dredgings off Dana Point, Orange county, and less common off Catalina Island and off Ensenada, Mexico. It is not uncommon in littoral collecting all along the coast of southern California. We have sets from the rocky shores at San Onofre, La Jolla etc. It is rather a variable species as as might be expected it is possible to select some unusual sets out of a tray containing several thousand specimens. I suggest only that some of these may have been given names. (Burch). Mr. A.M. Strong states " I am inclined to think that this is a good species with the adult only reaching a length of a little over an inch. It is certainly very much like what one would expect of a young idae. I have never seen a shell of this size which could definitely be said to be the young of M. idae."

Mitra diegensis (Dall),1919. Catalina Island to San Diego, Calif. (Dall). Type locality, San Diego, Calif.

Like a great many of Dr. Dall's species this one has never been figured and no one seems positive of what it is. The description reminds one of a shell that might be selected from a good series of what we know as catalinae. Mr. A.G. Smith writes of both diegensis and loweana " I suspect, as you do, that maybe these are M. catalinae . I have several lots from southern California that I have doubtfully labelled loweana but they are small and may be only the young stage of catalinae."

From the description this species is very similar to loweana with the spiral lines still stronger.

Collecting data: La Jolla (Chaney); So. Coronado Island in 10-18 fms. (Dr. Fred Baker).

Mitra loweana Pilsbry,1931. Nautilus, vol.45, no.1, p.29. New name for M. lowei Dall,1908. Range: Catalina Island, Calif. to San Geronimo Island, Lower Calif. (H.N. Lowe). Type locality, off Avalon, Catalina Island.

Mr. A.M. Strong states of this species " The description sounds very much like that of a young catalinae with the spiral striae a little stronger than usual and the color a little lighter as is usual in young specimens. "

However, Mr. George Willett considers it a valid species and has taken it off San Pedro, Calif. in 15-20 fathoms.

There is a paratype in the San Diego Museum from 50 fms. off Catalina.

Mitra solitaria C.B. Adams,1852. Point Loma, Calif. to Panama. (Dall) Type locality, Panama.

This species and the species orcutti following were placed by Dr. Dall under the subgenus Thala H. & A. Adams,1853.

Mr. A.M. Strong suggests that perhaps the Point Loma record for solitaria may have been a specimen of M. orcutti Dall.

Mitra orcutti Dall,1920. La Jolla, Calif.

It is possible that this species may be identical with the above mentioned M. solitaria. In any event it must be exceedingly rare. No member of the club having reported even seeing a specimen.

Mitra coronadoensis(Baker and Spicer)1930. Trans. San Diego Soc. Nat. Hist. vol. 6, #6, pp 176, pl.19, fig.1. Type locality, southeastern end of Los Coronados Islands. The holotype collected by Dr. Fred Baker in 6-18 fms is in the San Diego Museum of Natural History.

The original description follows:

" Shell small, dark brown, fusiform, with four smooth, shining, cream-white nuclear whorls forming a moderately expanding, cylindrical nucleus with a blunt apex, abruptly changing to the rapidly expanding, brown postnuclear whorls; postnuclear whorls three, sculptured throughout with strong,nearly vertical,incremental lines enlarging and turning sharply to the right at their upper extremities, and with fine, equidistant, sharply incised, punctate spiral grooves, three appearing on the first whorl, four on the second, and five above the periphery and twelve on the base of the third or body whorl; sutures not impressed, margined below by a narrow line of paler brown, the base also being of a pale ashen brown changing abruptly to the dark brown of the balance of shell at the peripheral groove; whorls slightly convex, shining; aperture narrow, brown; columella with three oblique, whitish plaits; outer lip not thickened or expanded.

Altitude, 13 mm; greatest diameter, 6.25 mm; length of aperture,8.25 mm.

This species differs somewhat from the similar Strigatella diegensis Dall in general contour, in the persistence of the incised spiral lines over the base and in the coloring which is generally lighter, and presents a welldefined pale line below the sutures and a uniform ashen-brown on the base. Besides other differences, it is distinctly smaller in all corresponding dimensions than Strigatella catalinae Dall and the spire is straight or slightly concave, while in S. catalinae it is convex."

Mitra fultoni E.A. Smith,1892. Ann. Mag. Nat. Hist., Ser.6, Vol.9, p. 256, text figure,1892; Williamson, Bull. So. Calif. Acad. Sci., Vol.4, p. 123, 1905; Proc. Biol. Soc. Wash., Vol. 19, p. 197, text fig. 6,1906. (fide Grant and Gale,1931, p. 636).

Range: San Diego, Calif. to West Mexico. Type locality, Point Abreojos, Lower California, Mexico.

" This species is rather slender for the orientalis group and can be distinguished by a slight shoulder on the whorls and some minor differences in sculpture" (Grant and Gale).

Dr. A. Myra Keen advises (Per. Comm.) " Dr. Stillman Berry reports Mitra fultoni from San Diego. Grant and Gale cite the original reference and discuss the species, which apparently must now be added to our fauna".

Mr. George Willett and others have taken specimens of this species from the Pleistocene of the Baldwin Hills, Los Angeles county.

Genus Volutomitra Gray,1857. Type. Volutomitra groenlandica Gray.
" Shell ovate or fusiform, smooth, covered with an epidermis, whorls simple; columella with oblique plaits; outer lip thin, simple, arcuate."(Adams,Vol.1

Volutomitra alaskana Dall,1902. Pribilof Islands,and southward. Off San Diego, Calif. in 822 fathoms. Type locality not specified in the original description according to Dr. A.M. Keen although stated to be Pribilof Islands by Oldroyd.

Genus Mitromorpha A. Adams in Carpenter,1865. Type (by monotypy) Mitromorpha filosa Carpenter.

" Shell small, elongately fusiform; whorls flattened, with revolving lirae, and sometimes longitudinally plicate. Aperture narrow; columella straight,slightly transversely lirate; lip acute, smooth within, scarcely sinuated posteriorly."

Grant and Gale,p. 596, make an excellent case for their theory that this group should be in the family TURRIDAE, and their conclusion has been generally accepted. However, they use Mitromorpha as a subgenus of the genus Mangelia whereas the consensus of opinion seems to be to accept the transfer to TURRIDAE but retain Mitromorpha as a genus of TURRIDAE.

A few of the points are that this group have no columellar plications which is characteristic of the MITRIDAE. They state that Thiele has shown that M. filosa, the genotype, has a Mangelia radula.

We are discussing this group here because for many years they have been placed by practically all authors in the MITRIDAE no doubt because of the mitriform appearance of the type species.

Dr. Joshua L. Baily Jr. comments on the problem as follows(Per. Comm. April,1945) " The absence of columellar plaits has convinced me that this genus does not belong to the Mitridae. But I would not include it under Mangilia. It may be closely related but it lacks the anal notch that characterizes the Turridae. Incidentally, I notice that you use the older name, Mangelia. To me this seems to be an obvious typographical error. Mangilia had best be considered a genus just as you are using it."

Mitromorpha filosa (Carpenter),1864. Monterey to the Gulf of Calif.(Dall). Type locality, Santa Barbara, Calif.

Grant and Gale, p. 597, give a complete English translation of the original description which in Mrs. Oldroyd's work is in Latin only with a brief outline by Tryon.

Collecting data: Not uncommon in littoral collecting in rock rubble, Malaga Cove, Point Vicente, Point Firmin, White's Point etc. (Burch); rare in Monterey Bay (A.G. Smith); San Geronimo Island, Lower Calif. and San Pedro and Monterey, Calif. (H.N. Lowe); La Jolla, Calif. (Bristol, Lowe and Beekswith); San Diego, Calif. (Hemphill); N. Coronado Id.(F.Stevens

Mitromorpha aspera Carpenter,1865. Monterey, Calif. to Coronado Islands (Dr. Fred Baker). Type locality, Monterey, Calif.

Collecting data:"A good species, fairly common in Monterey Bay from shore to 15 fms. It is quite distinct. Look for it in your dredgings of gracilior from Monterey" (A.G. Smith); dredged off Monterey,Calif. in 10 to 20 fms. (Burch); also dredged off Avalon, Catalina Island and off Redondo Beach, Calif. in 25 fathoms (Burch); Malaga Cove and San Pedro Calif. in 10-15 fms. (G. Willett); San Pedro and Monterey, Calif. (Lowe); San Diego,(Hemphill); La Jolla (Chaney); Ocean Beach (Bristol); Coronado Islands in 10-14 fathoms (Dr. Fred Baker).

Grant and Gale state that this species is intermediate between interfossa and crassaspera.

Mitromorpha interfossa (Carpenter),1865. Forrester Island, Alaska (Willett) to Catalina Island, Calif. Type locality, Neah Bay, Wash.(Fide Grant and Gale).

This species was described by Carpenter as a Mangelia . The original description is in Oldroyd, vol.2, pt.1, p. 144 as Mangelia interfossa .

Grant and Gale state that it is very close to aspera distinguished by its larger size,more elongate shell, less convex whorls, more numerous and less nodulous axial riblets and spiral cords.

Mitromorpha fuscoligata (Dall),1871. Monterey to San Diego, Calif.
Type locality, Monterey, Calif.

Grant and Gale,1931,p.599 described Mangelia (Mitromorpha) crassaspera giving a new name to the species formerly known as Daphnella fuscoligata Dall. The new name for Dall's fuscoligata was warranted by Grant and Gale if they placed the species under Mangelia which would make fuscoligata preoccupied by Mangelia rigida fuscoligata Carpanter. However, it is obvious that if Dall's species is transferred to the genus Mitromorpha or for that matter to any other genus in which the name fuscoligata is not preoccupied we must use Dall's name and not crassaspera.

Dall's description of Daphnella fuscoligata is in Oldroyd, v.2,pt.1, p.150.

However, there seems to be considerable difference of opinion about the entire problem of this species. Mr. A.G. Smith writes (Per. Comm), " We don't follow Grant and Gale and prefer to stay with Daphnella fusco-ligata. I believe Dr. Keen uses Daphnella also. Until better evidence is at hand based on radula etc., we cite it in the Turridae."
And Dr. A.M. Keen in " Abridged Check List",1937, p. 39 placed the following note after the name crassaspera Grant and Gale (? Unnecessary innovation; see Daphnella fuscoligata).

Collecting data: Dredged off Monterey in 20 fms. on the shale, off Redondo Beach in 25 fms., Malaga Cove in 15 fms. (Burch); San Pedro, Calif. in 20 fms. (G. Willett).

Mitromorpha gracilior Tryon, ex Hemphill MS,1884. Forrester Island, Alaska ? to San Geronimo Island (H.N. Lowe). The Forrester Island record by Dall is questioned by Mr. George Willett who collected the specimens on which practically all Forrester Islands records are based. Grant and Gale comment " no other reference for the northern part of the range".
Type locality, Monterey, Calif.

Collecting data: In our experience this is by far the most common species of this group. Monterey, San Simeon, Catucos, Punta Banda and Arbolitos, Lower Calif. Not uncommon in the dredgings off Monterey in 20 fms . and common off Redondo Beach in 25 fms. gravel and off Catalina Island. (Burch); Coronados Islands and Piedras Blancas, Calif. (Dr. F. Baker).

Grant and Gale state " This species is truly intermediate between filosa and aspera and interfossa. It is more slender than filosa, with a more elongate aperture and smooth outer lip, and has weak axial sculpture. M. aspera has stronger axial sculpture forming a nodulous,reticulate pattern with the spirals. M. interfossa is similar to aspera but has more numerous ribs and spirals than aspera and more rounded whorls.

Mitromorpha gracilior intermedia Arnold,1903. Monterey to Santa Rosa Island.
Type locality, Pleistocene of Deadman's Island.

Grant and Gale place this in the synonymy of M. gracilior, and comment upon the fact that Dr. Berry identified this species as living at Monterey.

Grant and Gale also place in this group the species described by Dall as Mangelia rhyssa Dall,1919. Range San Diego to Gulf of Calif.

ADDITIONS AND CORRECTIONS

Minutes #48 pp 7,8 . TETHYIDAE- Dr. Joshua L. Baily Jr. advises us as follows: " There is one point in the issue which arrived today which needs further elucidation which I am not able to give. On page 7 of #48 you give Tethys leporina Linnaeus as the type of Tethys and as the California representative you give Tethys californica. Now both of these statements are true but they are not true at the same time. Tethys leporina is the type of Tethys Linnaeus,1767, while Tethys californica belongs to the genus Tethys Linnaeus 1758. Unfortunately these two genera with the same name are not at all closely related.

Since biological nomenclature begins with the 1758 edition of the Systema Naturae, it follows that names published in this work are entitled to priority over names published in any other work. Our California animal then is correctly known as Tethys californica, and the type of this genus I do not know. I do not know if a type has ever been named, but I assume that Tethys depilans is the type. The genus to which Tethys leporina belongs has generally been called Fimbria Bohadsch, but in opinion #185 the International Commission on Zoological Nomenclature decided to throw out Bohadsch on the ground that the adoption of his names would make more confusion than it would settle. Presumably the commission knew what they were doing, but it seems to me unfortunate that the name Fimbria has to be discarded as there seems to be no other well known name available for this genus. It does not occur on our coast so we do not have to worry, but some one will have to dig up a name for it. I do'nt think anyone is qualified to do this who has not searched the literature carefully to see if any name is available. Certainly I should not undertake to name it."

Minutes #46, p.15 Cadulus tolmiei Dall,1897. Mr. A.G. Smith advises on the spelling of the specific name as follows :" I see only one item on which to comment, and that is the spelling of Cadulus tolmiei, which should have an "i" after the "m". The shell was named for the naturalist Tolmie. Dall left out the "i" in Bull. 112 but corrected it later in his " Additions and Emendations". Also I have checked the spelling against the original publication, a copy of which I have. It's a minor point but think you ought to correct it."

Minutes #45 p.17- #43 p.17 Semele pacifica Dall,1915. Carmen Island, Gulf of Calif.; Pta. Penasco and Guaymas, 20 fms.; Angel de la Guardia, 20 fms.; Magdalena Bay,10 fms.; San Juan del Sur, Nicauragua (H.N. Lowe).

This will extend the range of this species southward from Acapulco to Nicauragua.

Minutes #43, p. 18- Semele pulchra Sowerby,1832. San Diego (Hemphill); Point Loma (Bristol); San Felipe, Lower Calif. (F. Stephens); San Onofre, Calif. and Puntarenas, Costa Rica (H.N. Lowe).

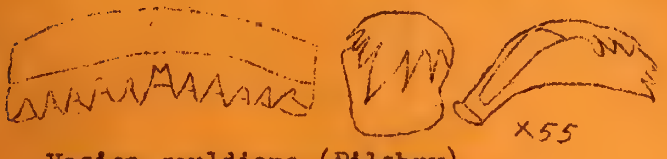
Minutes #43 p 23- Tagelus californianus (Conrad),1837. Ocean Beach,Mission Beach, Alamitos Bay, Calif.; Kino Bay, Sonora, Mexico; La Paz, Lower Calif., Mexico (H.N. Lowe).

Tagelus subteres (Conrad),1837. Ocean Beach, Alamitos Bay, Kino Bay, Sonora, Mexico (H.N. Lowe).

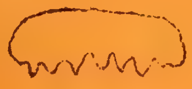
Tagelus politus (Carpenter),1857. While we do not agree the following note from Miss V.S. Bristol of the San Diego Museum should be considered:" Dr. Fred Baker once told me that Tagelus (?Mesopleura) politus Cpr. had only been found in three places-Mazatlan,San Pedro, and the slough beyond Torrey Pines, and that it might be the young of T. californianus. Later, he told me that T. affinis will not stand. It is the young of T. californianus."

Radulas of West American Mollusca

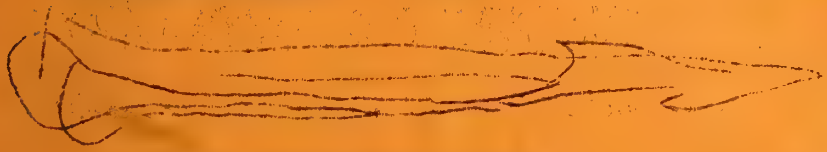
Here are drawings of a few radulas from our collection, of species that we have covered in the Minutes. I have also included a few from Tryon and one from Pilsbry and Lowes paper on the southern fauna. In all of these the tooth to the left is the central tooth and those to the right are the lateralsand marginals. These are duplicated on the left but are not shown. For a discussion of the parts and significance of the radula see Minutes #42, page 23. Thomas A. Burch



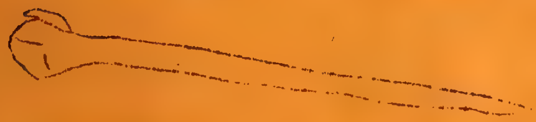
Vesica gouldiana (Pilsbry)



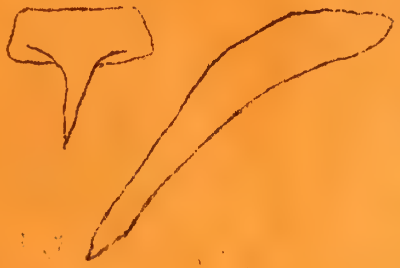
Marginella elegans Gmelin
(Tryon S.S. Conch.)



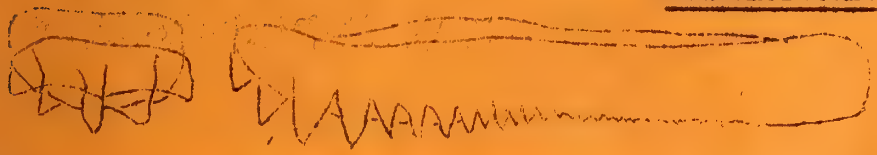
Conus californicus Hinds



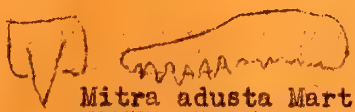
Moniliopsis incisa (Carpenter)



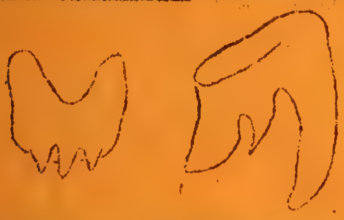
Pseudomelatoma torosa Carpenter



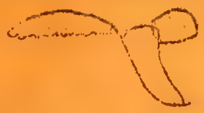
Mitra montereyi Berry- Redondo Beach 75 f



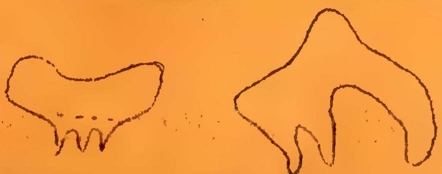
Mitra adusta Mart.
(Tryon)



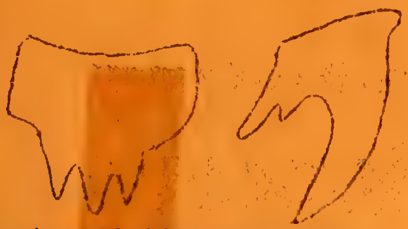
Cantharus distortus Linnaeus
(Tryon S.S. Conch.)



Oliva reticularis Lamarck
(Tryon S.S. Conch.)



Kelletia kelletii Forbes
Redondo Beach



Engina strongi Pilsbry & Lowe
(Pils. & Lowe)

Explanation of Plate

1. Vesica quoyana (Dall),1919. Sowerby,Thes. Conch. vol.2,pl.123,fig.71,1850
2. Haminoea vesicula (Gould),1855. Martini & Chemnitz,1806,vol.1,pl.15,f.23
3. Haminoea virescens (Sby.),1833. " " " " f.16
4/ " " " Sowerby, Thes. Conch., vol.2, pl.124, f. 83
5. " " " Newport Bay,Calif. (Burch) x 1.3
6. Philine californica Willett,1944. Redondo Beach,Calif.(Burch) typo
7. " " " " " " "
8. " " with animal crawling. See also drawing in Min.42 BP
9. Phytia setifer Cooper,1872. Terminal Island, Calif.(Burch) 8/36 x 2
10. " myosotis (Draparnaud) San Pablo,Calif. (Smith) x 2
11. " " " Long Island, N.Y. (Jacobson)x 2
12. Pedipes unisculatus Cooper,1866. Palos Verdes 8/36 (Burch)(5mm) x 3
13. Massyla modesta (Carpenter),1865. Puget Sound (T. Kincaid) x 1.3
14. Photo showing "Slim" Connoly, Miss Connoly, T. Burch and half of Dr. Gregg collecting Phytia on Terminal Island as described elsewhere in the Minutes by brushing them off the marsh grass. Drawbridge can be seen in the distance.
15. Photo showing "Slim", Doc Gregg, and T. Burch laborously collecting Pedipes and Truncatella at Palos Verdes just below the swimming pool. While it cannot be seen from the picture we are about 15-20 feet away from the water. From the picture it can be seen, however, that we have excavated a hole nearly waist deep. This is made easier by proceeding at the edge of the bank of rocks thrown up by the waves. In the fore--ground can be seen old seaweed and eel grass. Down a little where it was moist this had quantities of Fartulum.
16. Massyla crawfordiana (Dall)1891. Redondo Beach, 50f (Burch) 34mm x 1 .3
17. Massyla rhyssa (Dall),1919. Redondo Beach 75 f (Burch) x 2.6
18. " " San Vicente 20f. 9mm. (Burch) x 2.6
19. Admete couthouyi (Jay),1839. Puget Sound (T. Kincaid) 10mm x 2.6
20. " " " "
21. Olivella baetica Carpenter,1864. Series of 6 showing variation.
Off Redondo Beach, Calif. 25 f. (Burch).
22. Olivella pycna Berry,1935. Morro Rock, San Luis Obispo Co. (Burch)
23,24 Cystiscus subtrigona (Carpenter),1864. S. Coronado Id. 7-14f (Dr. Fred Baker) 2.5mm x 7
25. Cystiscus regularis (Carpenter),1864. Catalina Id. 25f (Burch) 3mm x7
26,27. Cypraeolina pyriformis (Carpenter),1865. Mission Bay (Burch) 2mm x7
28. Cystiscus jewettii(Carpenter),1857. Monterey 20f (Burch) 5mm x 7
29. Mitra idae Melville,1893. Terminal Island,Calif. x 1
30. " montereyi Berry,1920. Monterey 15 f (Burch) x 1.3
31. " " " Redondo Beach 75 f (Burch) x 1.3
32. Spisula dolabriformis Conrad,1867. left valve-- ANSP type #51411
33. " " " right " " "
34. " " left valve, Estero, Todos Santos Bay,Mex. (Burch)
35. " strongi n. sp. left valve Newport Bay (Strong) x 1.1
36. " " " inside of left valve
37. " " " inside of right valve
38. " " " hinge of right valve photodrawing
39. " " " " left " "
40. Spisula dolabriformis Conrad. Hinge of left valve drawn from photograph
" tilus
41. Mytilus edulis diegensis Coe. Newport Bay,Calif. (Burch) x$\frac{1}{2}$

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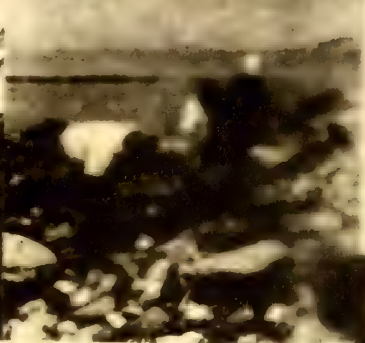

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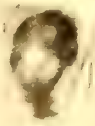
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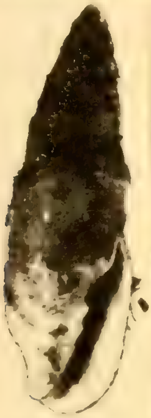
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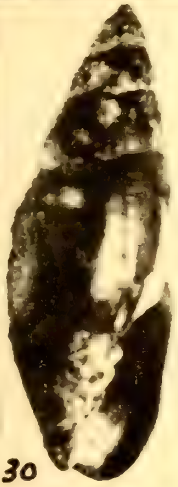
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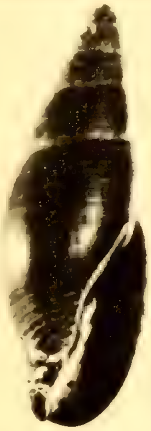
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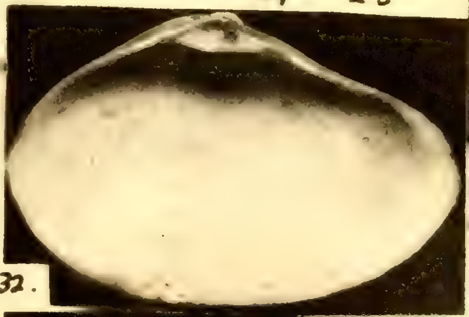
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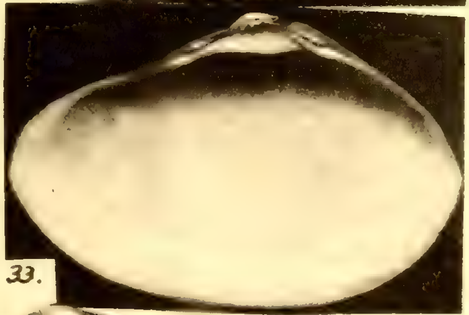
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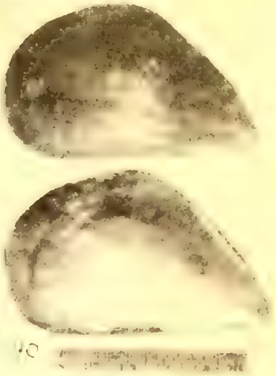
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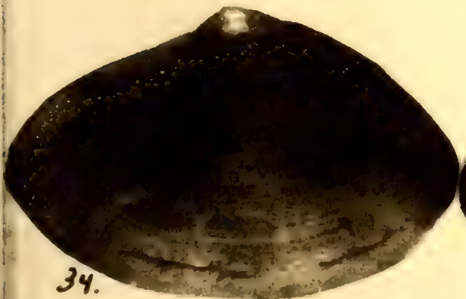
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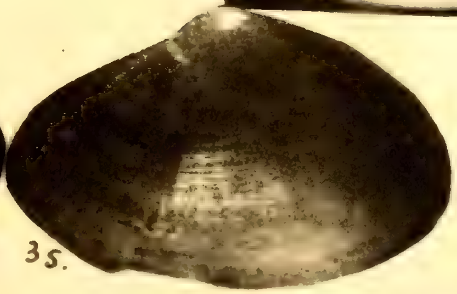
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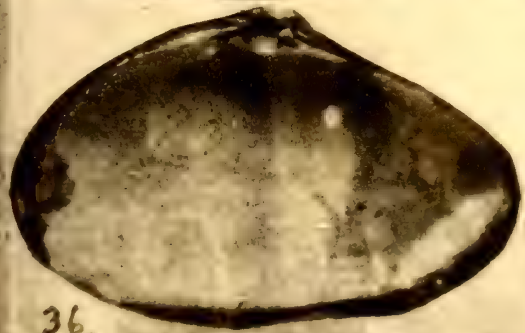
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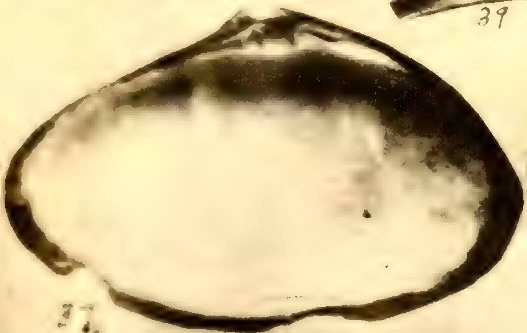
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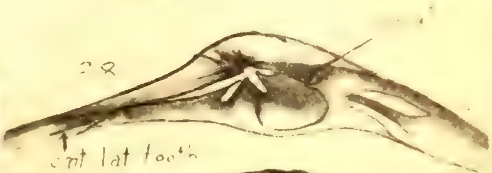
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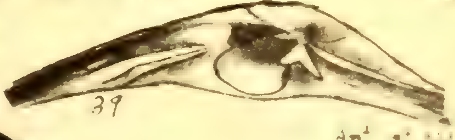
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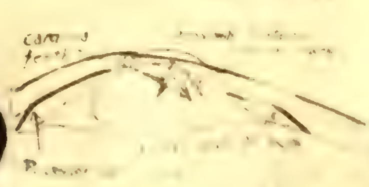
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ADDITIONAL NOTES ON WEST AMERICAN SPISULAS WITH A DESCRIPTION OF A NEW SPECIES

By Thomas A. Burch

Spisula dolabriformis Conrad,1867. Plate III, figs. 32,33,34,40.

This was described in the American Journal of Conchology, vol.3, p.193, and was figured in the same journal, vol.5, pl.2, fig.1 (see Minutes #44, p.15 for reproduction of figures). This figure shows that Conrad used a composite type. In 1894, Dall redescribed and refigured both species figured as Spisula dolabriformis by Conrad, Dall named the larger species Mactra hemphilli and the smaller Mactra dolabriformis (Nautilus, vol.7, p. 137, pl.5, fig.2 and p. 138, pl.5, fig.1 respectively.) (see Minutes #44, p. 16 for copy of figure of S. dolabriformis). Dall apparently was unaware of Conrad's figures since he made no reference to them, and had not seen Conrad's types since he stated that he had seen but two specimens of S. hemphilli,both of which came from San Diego and both of which presumably are in the U.S. National Museum collection.

Photographs of the smaller of Conrad's two type specimens sent to us by Dr . Jeanne Schwengel, show it to be identical with specimens that we have been calling Spisula dolabriformis. See plate III, figs.,32,34, & 40; also Minutes #44, p. 14. None of the specimens that the writer has seen have the ligament separated from the chondrophore by a shelly plate and hence belong to the genus Spisula and not to Mactra. Since Dall specifically stated in Nautilus, vol.7, p.138, that "Mactra dolabriformis " is a true Mactra with the ligament separated from the cartilage by a shelly plate" and since his figure does not have quite the same shape and proportions as the photograph of Conrad's type or specimens in our collection, it is possible that Dall actually described a Mactra but not Spisula dolabriformis. This probably could and should be checked at the U.S. National Museum where the specimen figured by Dall is located.

The larger of Conrad's type specimens is apparently no longer in existence. This is just as well since if it instead of the smaller specimen were extant, then what we know as Spisula hemphilli would have to be called S. dolabriformis , and what we know as S. dolabriformis would need another name.

Spisula strongi, new species Plate III, figs. 35 to 39.

Shell triangular, nearly equilateral, anterior end slightly longer; anterior dorsal margin nearly straight and sloping gently down,posterior dorsal margin rounded and sloping abruptly down; ends and ventral margin curved; small chink over site of ligament attachment surrounded by a small escutcheon; epidermis olive yellow, with a slight ridge of epidermis demarcating the posterior umbonal slope where the epidermis is wrinkled from the remainder of the shell where the epidermis is smooth except for incremental lines of growth; pallial sinus not extending as far anterior as cardinal area; right hinge with two and left hinge with one posterior lateral teeth and each hinge with but one small anterior lateral tooth neither of which is divided into proximal and distal portions; cardinal teeth like an inverted V with a posterior projecting spur at the apex. Area of ligament attachment not separated from the chondrophore by a shelly lamina. Length 52 mm., height 24 mm., width 17 mm.

This shell is nearly identical to S. dolabriformis but can easily be distinguished by the hinge. S. dolabriformis has the anterior lateral teeth divided into both a proximal and a distal portion, (see Minutes #44, p.8 and appendix to this article for classification of lateral teeth) while in S. strongi the anterior lateral teeth are very small and are not divided into proximal and distal portions. In addition the right valve of *S. dolabriformis* has two anterior lateral teeth while *S. strongi* has but one. Incidentally what I call the proximal anterior lateral tooth has been referred to by others as an accessory shelly lamina adjacent to the cardinal teeth.

The type specimen was collected from Newport Bay, Calif. by Mr. A.M. Strong. It has been sent to the U.S. National Museum.

KEY TO SPECIES OF SPISULA

Posterior end longer than anterior
. Pallial sinus deep .... *S. catilliformis*
. Pallial sinus shallow .... *S. polynyma alaskana*
Posterior end shorter than anterior
. Right valve with anterior inferior lateral tooth not divided into two distinct teeth,
.. Right valve with four lateral teeth .... *S. hemphilli*
.. Right valve with three lateral teeth .... *S. strongi*
. Right valve with anterior inferior lateral tooth divided into two distinct teeth, the proximal joining or nearly joining the anterior cardinal tooth.(referred to as an accessory shelly lamina adjacent to the cardinal teeth by some authors).
.. Left valve with anterior lateral tooth not divided into two distinct teeth.
... Anterior superior margin of shell definitely convex; hinge plate small in proportion to cardinal teeth; proximal anterior inferior lateral tooth of right valve definitely separated from cardinal teeth... *S. falcata*
... Anterior superior margin of shell nearly straight; hinge plate large in proportion to cardinal teeth ....*S. planulata*
.. Left valve with anterior lateral tooth divided into two distinct teeth; proximal anterior inferior lateral tooth of right valve nearly fused with the anterior cardinal tooth .... *S. dolabriformis*

APPENDIX: Classification of lateral teeth in *Spisula*.

I have tried to base this upon what I believe is a developmental premise as illustrated by our Pacific coast species. In my opinion the hinges of *S. catilliformis*, *S. hemphilli*, and *S. p. alaskana* are the most primitive or at any rate the least differentiated, since these species have but two lateral teeth in the left valve and four in the right valve (2 anterior and 2 posterior). In other species of *Spisula* one or more of these lateral teeth is separated into two more or less distinct teeth(they are not completely separated in *S. falcata* and *S. planulata* but are completely deparated in *S. dolabriformis*). Reference to drawings in Minutes #44, pp.9-14 and plate III, fig.40 should make this clear. Perhaps erroneously I have considered this a sign of differentiation and therefore advancement. Since I always get confused when teeth are numbered, as in Keen and Frizzell's Key to Pelecypod Genera, I have named the teeth according to their actual position with regard to the hinge. While the names may sound confusing, they can easily be figured out with the shell or drawing. Incidentally what I call the proximal anterior lateral tooth is referred to by Dall as an accessory shelly lamina adjacent to the cardinal teeth.

Additions and Corrections

Minutes #47,p.10 Dr. W.P. Woodring advises as follows (Per. Comm. May 1945) : " It may be pointed out that Berry described, but did not figure a Pleistocene Microglyphis from Hilltop Quarry as Acteon schencki (Bull. Am. Pal. vol.27, no.101, p.3, 1941). It is presumably a synonym of Acteon breviculus; at least I identify a Microglyphis from localities near Hilltop Quarry as A. breviculus. I think you are justified in giving generic rank to Microglyphis."

Middendorff references- Dr. A. Myra Keen advises as follows (Per. Comm. May,1945): " I find that Dr. Dall cited most of the Middendorff references incompletely. Much of my day today was spent trying to get exact dates of publication. It would be so much simpler if Middendorff had been content to publish his new descriptions just once. I think I have them straight now and have typed out a number of correct (I hope) references on a supplementary page. These are in no order, Iwarn you. Dall got most of the Middendorff dates right if not the references. Most of the pre-published descriptions came out in 1848, according to Sherborn, though another author says 1849. The illustrations are in two monographs, the first usually called the "Beitrage"(1849), the second the "Sibirische Reise"(1851). I defy anybody to find the references in any well-organized library under those titles The Beitrage was published as one of the Memoirs of the St. Petersburg Academy of Science, as I have shown on my sheet of notes, and the "Sibirische Reise" has quite another title. Both books are on my desk now,and I am going to type up an adequate explanation of plates (of which I will send you a carbon) before returning them to the Stanford Library's rare book room. Stanford's copy of the " Beitrage" has the late Czar's own book-plate in it."

" Incidentally, the correct title of the work Dall quotes as "Sibirische Reise" is: " Reise in den Aussersten Norden und Osten Sibiriens", Bd . II, Zoologie, Theil 1; Wirbellose Thiere ".

These references will be used more extensively in the next issue in which we discuss the Buccinidae.

A partial distribution of paratypes of the recently described species, Cardita redondoensis Burch, and Nuculana penderi redondoensis Burch was made to the following: California Academy of Sciences, Natural History Museum of San Diego, Stanford University, British Museum of Natural History, Dr. H.A. Pilsbry, Dr. W.J. Clench, J.R. le B. Tomlin, A.S. Koto, Dr. B.R . Bales, Dr. Jeanne Schwengel, W.J. Eyerdam, A.M. Strong, Morris Caruthers, E.P. Chace, Dr. W.O. Gregg, Maxwell Smith, Paul McGinty, Rev. Paul D. Ford.

Family FASCIOLARIIDAE

Key to Genera (From the notebook of Mr. A.M. Strong)

Columella plicate
. Outer lip with a tooth-like projection at the base .... Leucozonia
. Outer lip not toothed
.. Anal fasciole distinct
... Canal short,wide,spire short or moderate .... Fasciolaria
... Canal distinct,narrow,spire turrited .... Latirus
.. Anal fasciole absent
... Axial sculpture predominating .... Metzgeria
... Spiral sculpture predominating ....Ptychatractus
Columella smooth .... Fusinus

Genus Leucozonia Gray (Proc. Zool. Soc. London, pt. 15, p.136; type by original designation, Murex nassa Gmelin (Turbinella cingulifera Lamarck), Recent, West Indies. (fido Woodring,1928)

This genus is not represented in our fauna north of San Diego but the following species is described from the southern fauna.

Leucozonia cingulata (Lamarck),1822. Gulf of California to Ecuador. " Shell ovate, white with brown spiral ridges" (Strong). Reeve,Monoceros, pl.3, fig.11; Tryon, vol.3, p.96.

Genus Fasciolaria Lamarck,1799. Type (by monotypy), Murex tulipa L.

" Shell reaching a gigantic size, stout, fusiform. Nucleus forming a blunt apex, consisting of between one and two broad smooth whorls. Aperture long and very wide, contracted at base to form a short,relatively narrow,oblique canal, flaring and slightly emarginate at base.Siphonal fasciole low,broad. Columella bearing immediately above beginning of canal three low oblique folds, decreasing in strength upward. Parietal wall covered with glaze of callus. Interior of inner lip finely lirate. Anal fasciole narrow,depressed. Sculpture consisting of spiral cords and grooves, with or without axial nodes or ribs on the shoulder." (Woodring,1928)

This genus is not represented in our fauna north of San Diego, but the following key and list of species from the southern fauna will be of interest. It is taken from Mr. A.M. Strong's notebook.

Key to Species of Fasciolaria

Shell fusiform, with a moderate spire
. Aperture orange, outer lip with raised red spiral lines
6 to 9 inches. Gulf of Calif. to Peru .... princeps
Reeve, pl.1, fig.3; Tryon, vol.3, p.75
Shell pyriform, with a short spire
. Epidermis olive colored, aperture salmon tinted
4 to 5 inches. West Mexico to Panama .... salmo
Reeve, pl.3, fig.7; Tryon, vol.3, p.78
. Epidermis brown with black granules, aperture orange
5 to 7 inches. West Mexico to Panama .... granosa
Reeve, pl.3, fig.6.

Fasciolaria princeps Sowerby,1825. Magdalena Bay to Peru
Fasciolaria granosa Broderip,1832. Gulf of California to Panama.
Fasciolaria salmo Wood,1820. West Mexico to Panama.

Genus Latirus Montfort,1810. Type (by original designation)- Latirus auranriacus Montfort (= Murex filosus Lamarck = Murex gibbulus Gmelin) Recent, Australia. (fide Woodring,1928).

" Shell turrited, fusiform, umbilicated; spire produced, whorls nodulous; aperture oval-oblong; outer lip thin, crenulated; columella straight, with two or three small oblique plaits in front." (H. & A. Adams).

It is our opinion at this time that the genus Latirus is not represented in our fauna north of San Diego, Calif. However, it may be well to mention here that the species lugubris (C.B. Adams) described from Panama figured and described by Thomas A. Burch in Nautilus 54;46, pl.2, figs.5,6,7 as Cantharus, was listed by Pilsbryand Lowe as Latirus. Maxwell Smith followed in Panamic Marine Shells. Dr. Jeanne S. Schwengel published a paper in Nautilus 56:77,78 placing this species in the genus Drupa. Drupa lugubris (C.B. Adams) has been dredged in numbers off Redondo Beach and will be discussed under that chapter.

The following key and list of species from the southern fauna will be of interest. It is from the notebook of Mr. A.M. Strong.

Key to species of Latirus

Axial ribs tuberculate at the shoulder of the whorls
. Spiral ridges narrow, close-set, sharp on spire and base
Brown streaked, ridges whitish
2 to 2.5 inches. Panama .... candelebrum
Reeve, Turbinella, pl.2, fig.8; Tryon, vol.3, p.88
. Spiral ridges rounded, numerous, strongly tuberculate
Whitish, tubercles bluish
Central America to Ecuador .... tuberculosus
Reeve, Turbinella, pl.8, fig.42
. A few strong spiral ridges with spiral striae between
.. Four spiral ridges below the shoulder of body whorl on base
White, stained and spotted with rusty brown
2 to 3 inches. Gulf of Calif. to Ecuador .... ceratus
Reeve, Turbinella, pl.7, fig.37; Tryon, vol.3, p. 88
.. Six spiral ridges below the shoulder of the body whorl on base
Whitish, epidermis blackish Panama. .... rudis
Reeve, Turbinella, pl.10, fig. 51.
Axial ribs not tuberculate
. Spiral ridges on canal only
Reddish orange, epidermis bright chestnut
2 to 2.5 inches. Panama................................. castaneus
Reeve, Turbinella, pl. fig.26; Tryon, vol.3, p.91
. Spiral ridges over the entire surface
.. Axial ribs about 15
Orange brown, ribs darker
2.5 inches. Galapagos .... varicosus
Reeve, Turbinella, pl.2, fig.6; Tryon, Man. Conch. vol.3, p.92.
.. Axial ribs about 10
... Spiral ridges rather broad, close-set
Reddish-yellow, ridges sometimes darker
1.85 inches. Acapulco to Panama .... concentricus
Reeve, Turbinella, pl.1, fig.2 & 44; Tryon, vol.3, p.90
... Spiral ridges irregular, obtuse
Reddish-brown
Panama .... tumens
Tryon, vol.3, p. 91.

List of Species of Latirus

Latirus ceratus (Wood),1820. Gulf of California to Ecuador.
Latirus concentricus (Reeve),1847. Acapulco to Columbia
Latirus tuberculatus (Broderip),1833. Central America to Ecuador.
Latirus rudis (Reeve),1847. Panama.
Latirus castaneus (Reeve) (Gray), 1839. Acapulco to Panama
Latirus candelebrum Reeve Panama
Latirus tumens (Carpenter),1856. Panama
Latirus varicosus (Reeve),1847 Galapagos.

Genus Metzgeria Norman,1879. Type (by monotypy), Meyeria alba Jeffreys
" Shell elongate fusiform, longitudinally obtusely plicate; spire produced; canal exserted; columella obscurely plicate. Operculum irregularly ovate; apex obtuse; nucleus inconspicuous. " (Tryon, Structural and Systematic Conchology).

Metzgeria californica Dall,1903. Off Avalon, Catalina Island,California.
Collecting data: Catalina Island in 50 fms. (G. Willett); Catalina Island (H.N. Lowe).

Genus Ptychatractus Stimpson,1865. Type, P. ligatus Mighels & Adams .
" Shell fusiform, spirally striated; aperture with a moderate canal; columella plicated as in Fasciolaria.

The shell of this genus unites the form of a Sipho with the folds of a Fasciolaria; its small size, color, and northern habitat will distinguish it from the latter, even without taking into account the very diverse dentition; yet without the latter difference it would scarcely have been advisable to have separated the single species upon which the genus was founded from Fasciolaria. (Tryon S. & S. Conch.)

Ptychatractus occidentalis Stearns,1873. Bering Sea, Bering Island, and eastward to the Shumagin Islands, Alaska. Type locality, near Attou Island, Aleutian group, Bering Sea and Nagoi, Shumagins.

Dr. A. Myra Keen advises " Stearns description was not actually published until 1873 (Proc. Calif. Acad. Sci. vol.5, p.79) the 1871 issue having the status of advance proof sheets."

Ptychatractus californicus Dall,1908. Monterey Bay and near San Diego, Calif. in 822 fathoms. Type locality, off San Diego in 822 fms.
" Numerous flattish spiral threads and about 15 axial ribs. White, with a straw colored epidermis. 11 x 5.5 mm" (A.M. Strong).

Genus Fusinus Rafinesque,1815. Type (by monotypy, Lamarck,1799,-first species assigned tothe genus, which was originally described without species), Murex colus Linnaeus. New name for Fusus Lamarck , not Fusus Helbling.
" Shell large, slender, spindle shaped, with a long, nearly straight open anterior canal; aperture ovate, outer lip lirate within, parietal wall with callus deposit; sculpture of spiral threads or cords, usually prominent, and of low axial folds or ribs."

The following key and list of species covers the entire coast. It is taken from the notebook of Mr. A.M. Strong. We will then take up a more detailed discussion of the species from San Diego,Calif. northward.

Genus Fusinus
Canal long, narrow, tapering
. Axial ribs becoming obsolete on the body whorl
.. Axial ribs of upper whorls nodulated by spiral cords
... Whorls angulated or carinated
150 x 60 mm. Cerros Island to Panama .... dupetithouarsii
Reeve, pl. 2, fig.9; Tryon, vol. 3, p.58.
... Whorls rounded
110 x 40 mm Panama .... sulcatus
Tryon, Man. Conch. v.3, p.138; Nautilus, v.29, p.54.
.. Axial ribs of upper whorls undulated by spiral cords
... Axial ribs about 10
135 x 38 mm. Oregon to San Diego .... barbarensis
Oldroyd, vol.2, pt.1, p.177; Arnold, pl.4, fig.15.
... Axial ribs about 13
66 x 18 mm. Gulf of California .... colpoicus
Nautilus, vol.29, p.54
. Axial ribs extending to the periphery of the body whorl
.. Axial ribs spined at the shoulder of the body whorl
22 x 10 mm. Galapagos .... centrifugus
Nautilus, vol. 29, p.56
.. Axial ribs noduled at the shoulder of body whorl
... Shoulder of whorls distinctly angulated
50 x 19 mm. Santa Monica to San Diego............ arnoldi
equals traski,rugosus- Oldroyd, vol.2, pt.1,p.176; p.66,pl.3,f.4.
... Shoulder of whorls only slightly angulated
.... Body whorl with 4 or 5 major spiral cords
40 x 15 mm Gulf of California .... ambustus
Tryon, v.3, p.59; Carp. Maz. Cat. no.640 as F. tumens.
.... Body whorl with about 12 spiral cords
34 x 14 mm. British Columbia to Lower Calif. ..... monksae
equals robustus Oldroyd, vol.2, pt.1, p. 177
.... Body whorl with many fine spiral threads
75 x 26 mm. Panama Bay .... panamensis
Bull. Mus. Comp. Zool., vol.43, p.301.
.. Axial ribs reduced to lines of growth
21 x 8.5 mm. Off Ecuador in 1573 fms. .... fragillissimus
Bull. Mus. Comp. Zool. vol.43, p.301
Canal moderate or short, open
. Axial ribs extending to periphery of body whorl
.. Body whorl with about 22 spiral cords
60 x mm. Monterey to San Diego .... kobelti
.. Body whorl with from 10 to 15 spiral cords
... Whorls distinctly angulated
20 x 10 mm Gulf of California to Panama .... taylorianus
equals cinergons Reeve, fig.85; Tryon, vol.3, p.60
... Whorls not distinctly angulated
.... Axial ribs faint
11 x 5 mm. San Pedro .... dimiputus
.... Axial ribs distinct
80 x mm. Peruand Chile .... alternatus
plus fontainei Tryon, vol.3, p. 137
.. Body whorl with 3 or 4 major spiral cords
20 x 10 mm. Monterey to Gulf of California .... luteopictus
Oldroyd, vol.2, pt.1, p. 179.

.. Body whorl with 2 peripheral major spiral cords
11 x 5 mm. Panama .... porticus
Nautilus, vol. 29, p.56

. Axial ribs on upper whorls only
50 x 24 mm. Mendocino County, California .... harfordii
Oldroyd, vol.2, pt.1, p.180

. Axial ribs on body whorl only
17 x 8 mm. Gulf of California .... orcutti
Nautilus ,vol.29, p.57

List of Species of Fusinus.

Fusinus luteopictus Dall,1877. San Francisco Bay to Gulf of California
Fusinus monksae Dall,1915. British Columbia to Lower California
Fusinus arnoldi Cossmann,1903 (Traski Dall) Sta. Monica to Cerros Island
Fusinus barbarensis Trask,1855. Oregon to San Diego.
Fusinus kobelti Dall,1877. Monterey to Catalina.
Fusinus cinereus Reeve. Gulf of California.
  var. coronadoensis Lowe,1935. Gulf of California
  var. sororaensis Lowe,1935. Gulf of California.
Fusinus dupetithouarsii Kiener,1840. Cerros Island to Panama.
Fusinus ambustus Gould. Gulf of California
Fusinus colpoicus Dall,1915. Gulf of California.
Fusinus orcutti Dall,1915. Gulf of California.
Fusinus hertleini Lowe,1935. Gulf of California.
  var. bruneocincta Lowe,1935.
  var. alboscens Lowe,1935
Fusinus fredbakeri Lowe,1935. Gulf of California.
Fusinus felipensis Lowe,1935. Gulf of California
Fusinus sulcatus Lamarck. Panama.
Fusinus panamensis Dall,1908. Panama.
Fusinus centrifugus Dall,1915. Galapagos
Fusinus fragillissimus Dall,1908. Ecuador.
Fusinus fontainei d'Orbigny. Peru and Chile.

There are few groups involving a greater degree of confusion than the west coast species of the genus Fusinus. Without a doubt there will be additional species described and the vague conclusions reached in this paper must be materially altered when more information is available.

Dall placed the four most common of our species in Section Heilprinia Grabau,1904. Grant and Gale,1931, place the same species under Section Gracilipurpura Jousseayme,1880.

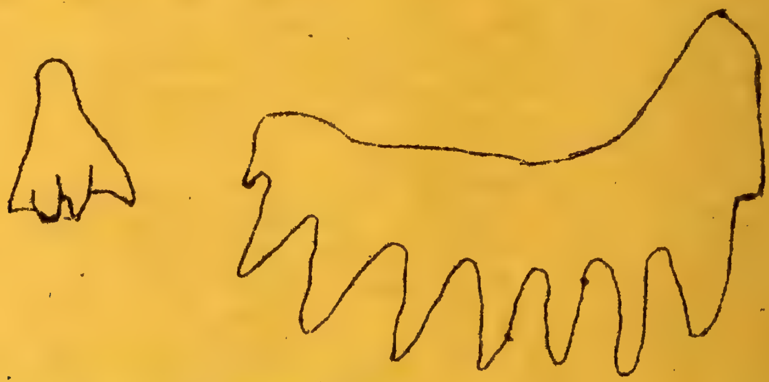
n Grant and Gale give a key to the species, but the fact that the same species appear in many southern California collections bearing a variety of names is proof of the need for a clearer key and explanation.

Fusinus arnoldi (Cossmann),1903. Rev. Paleozool. vol.7, p. 215,1903. New name for F. rugosus Trask, not of Lamarck. Also named F. traski by Dall in 1915. The confusion of names is clearly stated by Dr. Hanna " Rectifications of Nomenclature", Calif. Acad. of Sci., vol.13, no.10, p.166. F. arnoldi is the correct name.

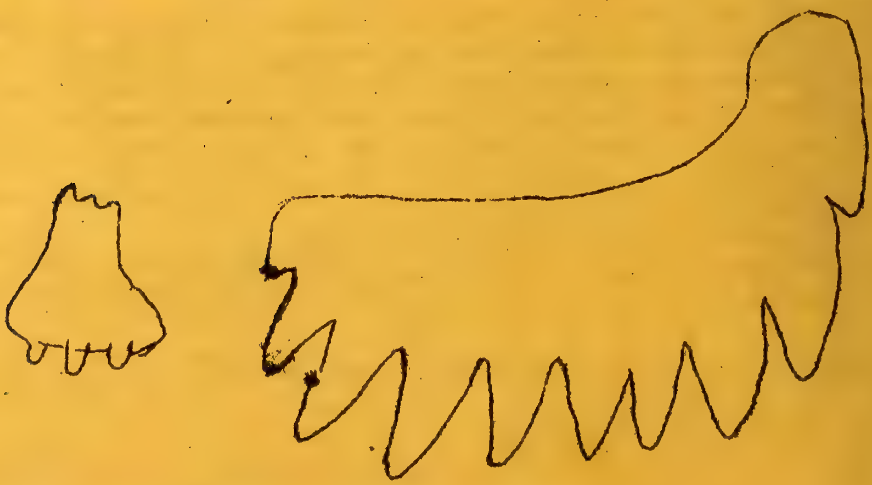
However, after we settle the name there still remains the question of just what is arnoldi. Is it a fossil species and not known in the Recent fauna? The shell we have been labelling Fusinus arnoldi is purple in color when fresh and has the prominent revolving brown lines mentioned by Grant and Gale. They make it a subspecies of F. barbarensis and the species we have been labelling F.barbarensis might bear out such a conclusion on form alone. However, our *barbarensis* coming from much deeper water than our *arnoldi* do not have the purple color and in addition seem to have a longer and more curved canal. Further proof that the two are distinct is the fact that the radula differs greatly. Drawings of the radulae will follow. They were prepared by Thomas A. Burch. The only real question involved then is whether or not the shells we have been labelling *barbarensis* are really that species or perhaps an undescribed species. We will figure this shell on our next plate. Mr. George Willett commentsas follows " I think Recent shells called *arnoldi* are young *barbarensis* and that true *arnoldi* is known only as a fossil".

The type locality is San Pedro, Calif.

Collecting data: A very common shell in gravel from around 25 fms. off Redondo Beach, and in the somewhat shallower gravel beds around 15 fms. off Santa Monica, Calif. and also off El Segundo, Calif. in perhaps as deep as 35 fms.; mouth of Tia Juana River (Frank Stephens); Catalina Island and San Pedro (H.N. Lowe); Cedros Island, Lower Calif. (Crocker); Redondo Beach in box trap at 650 ft. (Tremper); Newport in 40 fms. (Tremper); San Diego in 30 fms. (Gripp); Monterey in 15 fms. (Berry).



Fusinus barbarensis (Trask), 1855
off Redondo Beach, Calif. 75 fathoms (Burch).



Fusinus arnoldi (Cossmann), 1903.
off Redondo Beach, Calif. 25 fms. gravel (Burch).

Fusinus barbarensis (Trask),1855 . Heceta Bank, Oregon to San Diego,Calif. Type locality, Santa Barbara, Calif. fossil.

Collecting data: Dredged on rocky bottom in 50 to 75 fms. off Redondo Beach, Calif. (Burch); San Pedro and Newport from fishermen's nets (H.N. Lowe collection); Redondo Beach (Cass); Pt. Loma in 50 fms. (Dr. Fred Baker

Fusinus kobelti (Dall),1877. Monterey to Catalina Island (Dall). Type locality not given we are advised by Dr. Keen although Oldroyd states it is Monterey.

This is a heavier shell with a much shorter anterior canal than the two species mentioned above. The difficulty here is to distinguish between kobelti and monksae. Grant and Gale,1931, p.640 make monksae a subspecies of kobelti stating that it has a shorter anterior canal and weaker axial sculpture than kobelti. Mr. George Willett separates them as follows:

Varices 8, thicker ..... monksae..
" 9, thinner ...... kobelti

Mr. Willett's system seems to fit our custom of identification with more success than any of the others. In any event the species we have been labelling monksae (the predominant form off Monterey or from Cayucos north to Montery in our experience) is thicker than the shells we have been calling kobelti dredged off Catalina Island.

Collecting data: Off Avalon, Catalina Island in 35 fms. (Burch); Catalina Island in 30 fms. (H.N. Lowe); off Catalina Island (Hemphill) (Baker) (Chaney); San Diego in kelp roots (J.M. Cooke).

Fusinus monksae Dall,1915. Banks Island, British Columbia to Pequena Bay, Lower Calif. (Dall). Type locality, San Pedro, Calif. fossil, 80-100 ft. above sea level. (on advice of Dr. A.M. Keen).

Collecting data: An abundant species off Monterey on the shale in about 20 fms., also from Cayucos, San Luis Obispo Co., Calif. (Burch); Redondo Beach in 100 fms. also from box trap at 650 ft. (Tremper); Del Monte,Calif (Mrs. Oldroyd).

Dr. Dall placed the species luteopictus and diminutus under Fusinus s.s. Grant and Gale placed them under Harfordia Dall . Both luteopictus and harfordii are littoral species and both have short canals but the resemblance ends there in my opinion.(J. Burch). However, neither seem to be typical Fusinus and the consensus of opinion seems to be to follow Grant and Gale on this.

Subgenus Harfordia Dall,1921. Type (by monotypy), Fusinus harfordii (Stearns).

" Shell Buccinoid in shape but with the anterior canal produced; shell shorter than in typical Fusinus, with much shorter anterior canal."

Fusinus luteopictus Dall,1877. Monterey to Gulf of California (Dall). Type locality not given we are advised by Dr. A.M. Keen although Oldroyd gives it as Monterey.

Collecting data: Dredged in 10 to 20 fms. off Monterey on the shale, off Santa Monica in 10 fms., and collected in great numbers littoral at low tide at Malaga Cove, L.A. Co. in the rocky rubble, Point Firmin and Pt. Vicente in similar habitat, common on the San Pedro breakwater. The San Pedro shells seem to be somewhat different from the others although obviously the species (Burch); Redondo (Gripp); San Pedro (Lowe); San Pedro (Tremper); San Geronimo Island, Lower Calif. (Lowe); Monterey,Calif. (Lowe).

Fusinus diminutus Dall,1915. We are dropping this species from the list. Herbert N. Lowe in Nautilus 45:51,1931 published an article which definitely settled the matter of roperi . It is to be regretted that he did not at the same time examine the type specimen of diminutus about which there is a general idea that it is something of the same kind of thing. Mr. A.M. Strong writes (Per. Comm.) " It is stated in the description that this species had been received from San Pedro Bay from several collectors. No one seems to know who these several collectors could have been as no one here knew anything about it. Dr. Tremper hunted hard around San Pedro looking for the species. He had one specimen that seemed to fit Dall's description and figure but this was evidently a young and somewhat unusual specimen of Tritonalia poulsoni. Unless some one can come up with a valid specimen the name had better be dropped." However, Miss Viola Bristol, of the San Diego Museum advises that they have a specimen from Newport,Calif. labelled diminutus by Tremper and states " Our specimen is 3/8 inch high and looks to me like a young kobelti." Of course, it is still possible that this is a good species and it is to be hoped that some one will examine the type and settle the mystery.

And while on the subject of this kind of mystery we may as well dispose of Subgenus Roperia Dall,1898 and the species roperi Dall,1898. The Lowe reference given above in the Nautilus settled this matter. Lowe had the types examined by Wm. B. Marshall, Dr. Ralph B. Stewart,and Dr. W.P. Woodring and the unanimous verdict was that they are young Tritonalia poulsoni. Grant and Gale stated that it was a young Kelletia kelletii and Mr. A.M. Strong advises that Dr. Dall identified one of his shells as roperi that is definitely a young Kelletia. Since roperi is a Tritonalia, perhaps diminutus is the Kelletia. In any event Roperia and roperi are out.

Fusinus harfordii (Stearns),1871. Coast of Mendocino County, Calif. Type locality, near Big Spanish Flat, coast of Mendocino Co.

The only specimens of this species in local collections are a set in the E.P. Chace collection and a specimen in the Willett collection. Mr. A.M. Strong writes of it (Per. Comm. June,1945) " Fusinus harfordii Stearns was only known for many years by the type from Mendocino County, California. Later a number of specimens from the same general locality were found. The species is very similar in shell characters to some of the fossil species of Searlesia, a genus with but few living species but a large number of fossil species, all from other parts of the world. The animal is different from that of Searlesia dira , the only living species from the west coast and appears more like some of the Fusinus. More study will be required before it can be definitely stated in which genus it belongs."

Mr. and Mrs. E.P. Chace who collected them in Mendocino county call attention to the fact that harfordii and luteopictus both have the same colored animal, a flaming orange. They are of the opinion that the two species are properly placed in Fusinus and should also be placed in the same subgenus. They submit some comparative dimensions as follows:

	Harfordii	luteopictus	kobelti	S. dira
Height	46	26	33½	43
Diameter	22	9.6	15½	19
Body whorl inc. canal	25	13	20	20
Body whorl	20	10	11½	15
Canal	5	3	8½	5

Subgenus Aptyxis Troschel,1868.

Fusinus taylorianus Reeve,1840. Cape San Lucas to Panama. This species is not of our fauna although erroneously reported from San Pedro. It is of the southern fauna.

Family NEPTUNEIDAE

Genus Kelletia Fischer,1884, ex Bayle MS. Type (by monotypy),Kelletia kelletii (Forbes), southern California; Recent. We are advised by Dr. A. Myra Keen " Both the generic and specific names were originally written with a single "t". Dr. Dall in Bull. 112,Oldroyd etc. spelled it Kellettia.

" Shell of medium size or large, heavy, spire and aperture of about equal length; sculpture consisting of spiral striations or riblets and prominent nodosities on the shoulder of the whorls; aperture ovate, with a moderate anterior canal; outer lip not thickened, with lirations within; inner lip with a sharply delimited callus deposit, smooth; columella long somewhat sinuous, tapering toward the end; siphonal fasciole large, with an umbilical chinck or notch between it and the end of the columella; operculum with an apical nucleus; epidermis absent or a mere film. The type species attains a length of 145 mm. and a breadth of 75 mm." (from Grant and Gale,p.642).

Kelletia kelletii (Forbes),1850. Santa Barbara, Calif. to San Quintin Bay, Mexico. Also Japan. (Dall). Type locality, California.

Collecting data: The most abundant large mollusk between 10 and 35 fms off Santa Monica,Redondo Beach, Newport, Dana Point, Ensenada,Mex. in our experience. They are scavengers and will quickly fill all traps put out for lobsters,crabs, and in our experience our traps for other mollusks. Sold on the Redondo Beach pier for food and eaten by some of the foreign fishermen. (Burch); Todos Santos Bay (Orcutt); Scammons Lagoon, L.C. (Moorshead); Magdalena Bay (Cass); Coronado Islands, Mex. (Frank Stephens); San Diego in 12 fms. (Hemphill) (also Fred Baker); La Playa, Pt. Loma under fish cannery pier (Bristol); San Pedro (H.N. Lowe).

Genus Macron H. & A. Adams,1853. Type (by subsequent designation, Cossmann,1901) Macron kelletii (A. Adams).

" Shell ovate, heavy; strongly spirally sculptured or smooth; whorls moderately ventricose, body whorl much larger than penultimate whorl; aperture ovate,outer lip with a tooth like projection anteriorly, inner lip gently concave; anterior canal short, notched; epidermis strong, brownish or chestnut; operculum horny, with apical nucleus. Length 10 to 100 mm."

Macron lividus (A. Adams),1855. Farallone Islands to Point Abreojos, L.C. (Jordan). There was an error in the given type locality.

Collecting data: Our experience has been to find this species rare on Terminal Island and increasing in abundance from there southward to Todos Santos Bay, L.C. A very common species under stones at low tide. (Burch); Scammons Lagoon and San Martin Island (Dr. Fred Baker); Scammons Lagoon (Huey); Pt. Abreojos, L.C. (Hemphill); San Blas, Mex. and Cape Colnett, L.C. in mussel beds (H.N. Lowe); Cedros Island (Lowe); Pt. Loma and Newport Bay (Lowe); La Jolla (Bristol and Kate Stephens).

Macron aethiops kelletii (A. Adams),1855. Gulf of California. It is clear that this species is not of our fauna although reported from Catalina Island supposedly in error.

Other species from this coast south of San Diego are:

Macron aethiops (Reeve),1847 San Quintin Bay, L.C. to Gulf of California.

Macron orcutti Dall,1918. Magdalena Bay, L.C.

Genus *Cantharus* Roeding,1798. Type (by subsequent designation,Suter, 1913), *Cantharus globularis* Roeding = *Buccinum tranquebaricum* Gmelin.

This genus is not reported from our Recent fauna but is abundant in many of our fossil deposits. Thomas A. Burch figured the species *lugubris* C.B. Adams as *Cantharus* in the Nautilus 54:46 but this species will be placed under the genus *Drupa*.

The following list of species of the southern fauna from the notebook of Mr. A.M. Strong may be of interest.

Cantharus elegana (Gray),1833.	Gulf of California to Peru.	
Cantharus gemmatus (Reeve),1846.	Gulf of California to Peru.	
Cantharus sanguinolenta (Duclos),1833	Gulf of California to Peru	
Cantharus ringens (Reeve),1846.	Gulf of California to Ecuador	
Cantharus exanthomatus Dall,1919.	Lower California	
Cantharus aequiliratus Carpenter,1857.	Mazatlan.	
Cantharus vibex (Broderip),1832.	Magdalena Bay to Ecuador	
Cantharus cinis Reeve,1846.	Panama and Galapagos	
Cantharus undosus Lamarck	Ecuador	Atlantic ?
Cantharus biliratum (Reeve),1846.	Galapagos	
Cantharus procerum Sowerby,1832	Panama	
Cantharus janelli Kiener,1835.	Peru	
Cantharus bolivianus E. and S.,1852	Peru and Chile	
Cantharus inca d'Orbigny,1841.	Peru and Chile	
Cantharus pagoda Reeve.	Panama.	

Genus *Triumphis* Gray,1857.

This genus is not represented in our fauna but the following species are described from the south on this coast.

Triumphis distortus (Gray),1856.	Puntarenas to Ecuador
Triumphis subrostratus (Gray)	Acapulco to West Columbia

Genus *Pyrolofusus* Morch,1869. Type, *Fusus deformis* Reeve(fide Dall)

We are advised by Dr. A. Myra Keen (Per. Comm. June,1945) "According to the only nomenclator I have at hand, the original spelling was *Pyrolofusus*, and *Pyrulofusus* was a misprinted citation of it later. Dall in 1916 correctly spelled it but later adopted the other form. I have not seen the original but suspect there is no ground for emendation; there would be none unless Morch definitely said he named it for its analogy with *Pyrula*."

" Shell large, relatively thin, with a very short spire and large body whorl, usually sinistral but with rare dextral individuals; nucleus very large, smooth, flat-topped, infolded with an apical dimple,subsequently spirally sculptured, with obscure axial folds; periostracum thin, dehiscent; aperture simple, the outer lip expanded and thickened, the body and pillar enameled, often brightly colored; the canal very short, shallow and wide, hardly incurved, and with no evident siphonal fasciole; operculum much smaller than the aperture, rounded-quadrate with apical nucleus: radula, chrysodomoid but rather irregular, the rhachidian tooth in the typical species tricuspid; the laterals with two large terminal cusps, the median cusp of the central tooth variable." (Dall).

Pyrolofusus deformis(Reeve)1847. Arctic Ocean and south to the Shumagin Islands, Alaska. Circumboreal. (Dall). Type locality, Spitzbergen.

Pyrolofusus harpa (Morch),1858. Pribilof Islands to the Aleutians and eastward to Kodiak Island, Alaska. (Dall). Type locality, Sitka,Alaska.

Collecting data: Sitka, Alaska, type locality (W.J. Eyerdam).

Pyrolofusus harpa dexius Dall,1907. Petrel Bank, Bering Sea in 54 fms.

Genus Volutopsius Morch,1857. Type (fide Dall,1918), Volutopsius largillierti (Petit de la Saussaye), described as Fusus.

" Shell resembling that of Neptunea, but with a large body whorl, a more ample aperture, a short, hardly differentiated anterior canal, and a short blunt, few-whorled spire."

Volutopsius fragilis Dall,1891. Bering Sea, 15 to 121 fathoms. to Dutch Harbor, Aleutian Islands.

Collecting data: Dutch Harbor, Aleutian Islands on rocks,1932 (W.J. Eyerdam).

Volutopsius melonis Dall,1891. Bering Sea, 227 fathoms.

Volutopsius behringi (Middendorff),1848. Arctic Ocean to Pribilof Islands, 17 to 50 fathoms (Dall). Type locality, Bering Sea.

Dr. A.M. Keen advises " Middendorff spelled behringi with an "h" con-sistently." Correct reference is " Beitrage", p. 476. Tritonium behringii Middendorff,1848. Bull. Acad. Imp. Sci. de St. Petersburg, Phys. Math. Cl. vol.7, no.16, p.243; figured in " Beitrage" ref. above), p. 147, pl.3, figs 5-6.

Collecting data: Kodiak Island, Alaska (G. Willett)

Volutopsius behringi kobelti Dall,1902. North end of Nunivak Island, Bering Sea, and at the Pribilof Islands (Dall). Type locality, Pribilof Islands.

Volutopsius stefanssoni Dall,1919. Arctic Ocean to Pribilof Islands (Dall). Type locality, Point Barrow, Alaska.

Volutopsius rotundus Dall,1919. Kodiak Island to Cook's Inlet (Dall). Type locality, Kodiak Island.

Volutopsius middendorffii Dall,1891. Bering Sea, 57 to 225 fathoms.

Volutopsius simplex Dall,1907. Off Bering Island, Bering Sea, in 72 fms.

Volutopsius attenuatus Dall,1874. Arctic Ocean south to the Pribilof Islands and Bristol Bay (Dall). Type locality, Cook's Inlet, Alaska.

Volutopsius trophonius Dall,1902. Bering Sea, in 81 fathoms, south of the Pribilof Islands.

Volutopsius filosus Dall,1919. From the Pribilof to the Aleutian Islands, Bering Sea. (Dall).

Volutopsius callorhinus Dall,1877. Pribilof Islands, Bering Sea.

Volutopsius callorhinus stejnegeri Dall,1884. Bering Sea.

Volutopsius castaneus (Morch),1858. Pribilof, Aleutian, and Kodiak Islands, Alaska. Type locality, Sitka, Alaska.

Collecting data: Umnak and Kodiak Islands, Alaska (G. Willett); Point Barrow, Alaska (Brower); Unalaska, Amlia, and Atka islands, Aleutian Islands, on rocks below lowest tide mark, 1932 (W.J. Eyerdam).

Volutopsius regularis Dall,1873. Pribilof, Aleutian, and Sannakh Islands, Alaska (Dall). Type locality, Unalaska.

Genus Jumala Friele,1882. Type (fide Dall) J. turtoni (Bean).

Dr. A. Myra Keen advises (Per . Comm. June,1945) " As Grant and Gale point out, Dall's case for Beringius is weak; in fact, it is in the same class as (d) above. Jumala Friele,1882 would seem to have priority over Beringius Dall,1886 , the first date of actual publication. "

Grant and Gale,1931, p.653 state " Beringius Dall was supposed to have been established in 1879, that name having been used in the explanation of a plate of which Dall had fifty proof copies distributed to conchologists, but its status is questionable as of that date. The type is conchologically similar to the N. lirata group."

" Central plate small, quadrangular, unarmed, laterals hooked, with two small teeth on the inner margin" (Tryon S. & S. Conch.)

Jumala crebricostata (Dall),1877. Plover Bay, the Aleutian Islands, and eastward to the Shumagin Islands, Alaska.(Dall). Type locality, Unalaska in 100 fathoms.

Collecting data: Izhut Bay, Afognak Island,1922; Sitkalidak Island, 1931; (W.J. Eyerdam) *** Extension of range eastward from Shumagin Ids. about 200 miles.

Jumala crebricostata undata (Dall),1919. Unalaska, Alaska, south and east to British Columbia in 238 fathoms (Dall). Type locality, Cygnet Inlet, Boca de Quadra, Alaska in 160 fathoms.

Collecting data: Unalaska, Aleutian Islahds, dredged ,1932 (Eyerdam).

Jumala kennicottii (Dall),1907. Aleutian Islands to Cook's Inlet, Alaska. Type locality, Captain's Harbor, Unalaska.

Collecting data: Petersburg, Alaska (G. Willett); Izhut Bay,Afognak Island,1922; Chichagoff Island,1934; Sitkalidak Island,1931 (Eyerdam).

Jumala kennicottii incisa (Dall),1907. Petrel Bank, Bering Sea in 54 fms. to Illulliuk Bay, Unalaska Island (Eyerdam).

Collecting data: Illulliuk Bay, Unalaska Island, 1932 (W.J. Eyerdam).

Jumala stimpsoni (Gould),1860. Point Barrow to the Pribilof Islands, Alaska. Type locality, Arkancheche Island, Bering Straits.

Collecting data: Icy Cape, Arctic coast of Alaska (W.J. Eyerdam); Point Barrow, Alaska (Brower);

Jumala malleata (Dall),1884. Arctic Ocean and northern Bering Sea (Dall) Type locality, Point Barrow, Arctic.

Jumala frielei (Dall),1894. Pribilof Islands, Bering Sea, 66 fathoms.

Jumala aleutica (Dall),1894. Amukhta Pass, Aleutian Islands, 248 fathoms/

Jumala marshalli (Dall),1919. Pribilof Islands to Unalaska, Alaska. Type locality, off Unalaska in 78 fathoms.

Jumala indentata (Dall),1919. Kotzebue Sound to the Aleutian Islands, also north Japan seas (Dall). Type locality, off the Khudubine Ids.,Bering Sea.

Genus Liomesus Stimpson,1865. Type (by original designation), Buccinum dalei J. de C. Sowerby.

" Shell of moderate size, bucciniform; with spiral striations or threads; pillar short, twisted; outer lip thickened, not reflected; operculum with an apical nucleus; periostracum conspicuous"

" This genus is similar to Buccinum but has an operculum with an apical nucleus." (Grant and Gale, 1931, p. 666).

Liomesus nassula Dall,1901. Bering Sea from the Pribilof Islands to the Peninsula of Alaska, 34 to 121 fathoms. Japan? (Dall). Type locality, 121 fms. near the Pribilof Islands, Bering Sea.

Collecting data; Bering Sea (Lewis).

Liomesus ooides (Middendorff),1848. Okhotsk Sea, also Pleistocene of Yesso, Hokkaide, Japan. (Dall). Type locality: " Sin. Tugur, maris ochotensis (Tugur Bay, Sea of Okhotsk).

Dr. A. Myra Keen advises (Per. Comm. June,1945) that Dall cited the pagination of a separate in the National Museum library. The original pagination in the serial should be cited instead. The correct reference should be Bull. Acad. Imp. Sci. de St. Petersburg, Phys.- Math. Cl., vol.7, p.246; " Beitrage" (not figured), p. 504.

Collecting data: Sitkalidak Island,1931. *** Extension of range eastward across the north Pacific ocean to Gulf of Alaska.

Liomesus ooides canaliculatus (Dall),1874. Icy Cape, Arctic Ocean to the Shumagin Islands (Dall). Type locality, Cape Espenberg, Arctic Ocean.

Liomesus nux Dall,1877. Aleutian Islands to Shumagin Islands, Alaska. Also Japan Seas. Type locality: Aleutian Islands in 10 fms.

Collecting data: Umnak Island, Alaska (G. Willett).

Genus Mohnia Friele,1878. Type, Fusus mohnii Friele.

" Shell ar in Siphonorbis or Plicifusus, but the whole nepionic shell smooth (it is sculptured up to the larval whorls in other species); operculum coiled, pauci-spiral; radula, with one cusp on the rhaohidian and two on each lateral tooth; oviecapsules solitary, as in Tritonofusus.(Dall)

Mohnia robusta Dall,1913. Off the Pribilof Islands, 987 to 1,401 fathoms.
Mohnia corbis Dall,1913. Off the Pribilof Islands, 1,771 fathoms.
Mohnia frielei Dall,1891. Off the Queen Charlotte Islands, B.C. in 876 fms.
Mohnia vernalis Dall,1913. Tillamook Bay, Oregon, to Monterey, Calif. ; 786 to 881 fms. (Dall). Type locality: off Tillamook,Ore. in 786 fathoms.
Mohnia siphonoidea Dall,1913. Off Pribilof Islands, in 987 fathoms.
Mohnia exquisita Dall,1913. Bering Sea, off Koniugi Island, Aleutians in 1,786 fathoms.

Genus Ancistrolepis Dall,1894. Type (by original designation) Chrysodomus eucosmius Dall (fide Grant and Gale who use it as a subgenus of Neptunea, p.657)

" Shell Buccinoid with a short, twisted canal; operculum straight, claw shaped, with apical nucleus." (After Dall) (Grant and Gale).

" Ancistrolepis is distinguished from Neptunea by its short, wide anterior canal. The columella is strongly incurved in the middle. The type species has prominent, widely spaced spiral ribs. The same is true of the type of Beringius Dall,1886 , though the latter has a higher spire. Perhaps Ancistrolepis should be considered a section or synonym of Beringius"(Grant and Gale, p.657).

Ancistrolepis eucosmius (Dall),1891. Pribilof Islands, Alaska to Tillamook Bay, Oregon, 67 to 786 fathoms. (Dall). Type locality, off Unalaska Island.
Ancistrolepis eucosmius bicinctus Dall,1919. Pribilof Islands to Shumagin Islands, Alaska, in 34 to 280 fathoms (Dall). Type locality, southeast of Unalaska.
Ancistrolepis magnus Dall,1895. Okhotsk and Bering Seas, 25 to 70 fms.
Ancistrolepis californicus Dall,1919. Fuca Strait to San Diego, Calif. , 152 to 984 fathoms (Dall). Type locality, in 984 fathoms near Cortez Bank.
Grant and Gale state that this is identical with eucosmius.
Ancistrolepis beringianus Dall,1919. Bering Sea, off Starichkoff Island,58f

Genus Sulcosinus Dall,1894. Type (by original designation), Buccinum taphrium Dall,1891.

" Shell thin, with a deeply channeled suture, strongly reflected lip, and thick parietal callous deposit." (Dall).

Sulcosinus taphrius (Dall),1891. Bering Sea, off Unalaska, in 351 fathoms.

Genus Exilioidea Grant and Gale,1931. Mem. San Diego Soc. Nat. Hist. vol.1, p.665. Type (by original designation), Chrysodomus rectirostris Carp.

" Shell elongate, very slender, with numerous whorls, chrysodomoid nucleus, and a straight canal;periostracum conspicuous, polished; sculpture of numerous fine flecuous axial ribs and spiral striation; aperture small, simple, not lirate within, outer lip thin, sharp, not reflected; inner lip and pillar smooth,without plications or denticles of any sort; operculum long, slightly arcuate, with apical nucleus. (Dall,1918, description of Exilia)

Several problems are presented here and the last has certainly not been heard. Grant and Gale, following Stewart,1927, claimed that Conrad's Exilia has a Turrid notch and belongs in the family Turridae. For this reason they described the new genus Exiliodea for our recent species.

However, a more recent paper " A Systematic Study of the Fossil Gastropod Exilia" by Herdis Bentson, University of California Publications, Bull. of the Dept. of Geological Sciences, vol.25, no.5, pp.202-203 discusses the relationship of Exilia to Exiliodea and claims that the statement that Conrad's type species has a Turrid notch is not true and places the entire fossil group under the family Fusinidae. Bentson considers Exiliodea distinct for a number of other reasons.

Dr. A. Myra Keen advises (Per. Comm. June,1945) " Note that the original spelling is Exilioidea , not Exiloidea as Bentson cited it. Because Dr. Bentson made a careful and thorough study of the problem of classification of these gastropods, I am inclined to accept her decisions wherever she has any evidence at all for them, as in her analysis of nuclear differences, etc. The geologic distribution of the faunas involved would confirm her conclusion that Exilioidea is a separate entity from Exilia. The latter is a member of a warm-water fauna that was widespread in the Eocene and persisted to the Oligocene. Then we have no further record until the Pliocene when among a cool-water assemblage a similar-looking form appears. That fact alone should warn one to look for differences rather than resemblances. It might even be possible that Exilia is a member of the Fusinidae while Exilioidea belongs in the Neptuneidae."

Exilioidea rectirostris (Carpenter),1865. Behm Canal, Alaska, to Cape San Quintin, Lower California (Dall). Type locality, Puget Sound (fide Grant and Gale).

Collecting data: Dredged off Redondo Beach, Calif. in 75 fms. in fine gravel and mud (Burch); Forrester Island, Alaska in 50 fms. (G. Willett); off Catalina Island, Calif. in 80 fms. (G. Willett).

Exilioidea kelseyi (Dall),1908. Crescent City,Calif. to San Diego, Calif. 50 to 359 fathoms. Type locality, off San Diego in 124-359 fathoms.

Collecting data: Off Catalina Island, Calif. in 80 fathoms (G. Willett); we are advised by Dr. Keen that there are specimens in the Stanford University collection from off Crescent City, Calif. in 30 fathoms which is an extension of range northward. Dr. Keen states that these specimens seem to be kelseyi though with stronger sculpture.

Genus Plicifusus Dall,1902. Type (by original designation), Fusus kroyeri Moller (fide Grant and Gale).

Grant and Gale place these species under Section Plicifusus under subgenus Colus under genus Neptunea. However, Plicifusus has been very generally given generic standing, Hirase's Japanese Shells etc. etc.

" Shell strongly plicate axially, smooth or spirally sculptured, usually with an inconspicuous periostracum; nucleus Chrysodomoid; aperture ample, the outer lip markedly flexuous behind, slightly expanded, simple, sharp; the pillar callous, the canal slightly twisted and recurved, moderately long; operculum as in Colus." (Dall,1918).

Plicifusus kroyeri (Moller),1842. Point Barrow, Arctic Ocean south to Vladivostock, Gulf of Peter the Great, in Japan Sea, east coast of Siberia (Eyerdam). Circumboreal. Johnson gives the range in the Atlantic as Greenland.

Collecting data: Vladivostock as reported above by W.J. Eyerdam is a southward extension of range of several thousand miles. Point Barrow (Brower).

Plicifusus arcticus (Philippi),1850. Arctic Ocean, Bering Sea, Aleutians to Shumagin Islands,Alaska.Circumboreal. Greenland. Type locality,Spitzbergen.

Plicifusus johanseni Dall,1919. Point Barrow to Icy Cape, Arctic Ocean. Type locality, Icy Cape.
?Plicifusus verkruzeni (Kobelt),1876. Arctic ocean to Bering Strait. Circum-boreal. Type locality, Porsangerfiord (Norway).

Subgenus Retifusus Dall,1916. Type (by original designation),Tritonium jessoense Schrenck.

" Shell of small to moderate size, with a conspicuous dark usually vernicose periostracum; axially plicate, the surface reticulated by sharply incised spiral grooves; nucleus swollen, chrysodomoid; outer lip flexuous, slightly reflected, sharp, without internal lirae; canal short, recurved, with the siphonal fasciole indistinct; operculum arcuate with apical nucleus." (Dall,1918).

Plicifusus virens (Dall),1877. Bering Sea to Middleton Island, Alaska. Japan? (Dall). Type locality, Kyska Harbor in 10 fathoms.
Plicifusus incisus Dall,1919. Arctic Ocean; Bering Sea; east to the Shumagin Islands 38 to 54 fathoms (Dall). Type locality, USFC Sta. 3643, western Bering Sea.
Plicifusus oceanodromae Dall,1919. Petrel Bank, Bering Sea; the Aleutians to the Shumagin Islands (Dall). Type locality, Petrel Bank, Bering Sea.

Subgenus Microfusus Dall,1916. Type (by original designation), Chrysodomus acutispiratus Sowerby.

" Shell small, with a somewhat villous, inconspicuous periostracum; nucleus smooth, swollen, obliquely tilted, chrysodomoid; subsequent whorls near the apex axially ribbed, the remainder without axial sculpture; spiral sculpture of fine close threading; suture appressed, spire acute; aperture shorter than the spire, with a wide, very short, recurved canal; outer lip simple, sharp; pillar without callous deposit, or marked siphonal fasciole." (Dall,1918).

Plicifusus brunneus (Dall),1877. Port Clarence, Bering Strait, to Nunivak and the Pribilof Islands. (Dall). Type locality, Nunivak Island,Bering Sea in 10 fathoms.

Subgenus Latifusus Dall,1916. Type (by original designation), Chrysodomus griseus Dall.

" Shell short and broad, whitish, with a dull slightly villous periostracum; arcuately plicate with fine spiral threading; canal and aperture as long as the spire; outer lip strongly flexuous behind, slightly thickened and reflected; pillar short, smooth, with the body coated with callus in the adult; canal short, wide, recurved, with the siphonal fasciole feeble; operculum arcuate, the nucleus apical and in perfect specimens incurved; the apex of all the specimens is more or less eroded, but appears to have been acute and chrysodomoid." (Dall,1918).

Plicifusus griseus (Dall),1890. Bering Sea (27 fathoms) to San Diego,Calif. (636 fathoms). Type locality, USFC Sta. 2839, near the islands off Santa Barbara, Calif. in 414 fathoms. Point Barrow, Alaska (W.J. Eyerdam).

Subgenus Helicofusus Dall,1916. Type (by original designation), Chrysodomus laticaudatus Dall (= Tritonofusus (Plicifusus) aurantius laticordatus Dall)

" Shell small, short, inflated, with an external chalky layer covered with a dark rude periostracum, both usually eroded; the inner shell layer of an orange color; nucleus large for the shell, depressed, domelike, smooth, and of about one whorl; the succeeding whorl or two with short small axial ribs, the later whorls with only fine spiral sculpture, usuallu eroded; aporture as long as the spire; outer lip sharp, fleauous behind, not reflected; body and pillar with a thin callus; pillar short, twisted, abruptly bent to the left with the wide short canal, no siphonal fasciole present; operculum as in *Plicifusus*." (Dall,1918).

Plicifusus laticordatus (Dall),1907. Bering Sea (33 to 76 fathoms) south to Fuca Strait (559 fathoms). (Dall). Type locality, Sta. 3279, in 41 fms. Bristol Bay.

Genus *Colus* Roeding,1798. Type (by subsequent designation, Dall,1906) *Murex islandicus* Gmelin.

" Shell long-fusiform, slender, with numerous moderately rounded whorls, the nucleus Chrysodomoid, the shell structure usually white, often with a chalky external layer under a conspicuous, usually brownish, adherent periosptracum; sculpture spiral, seldom very strong, sometimes nearly obsolete,never axially plicate or ribbed; aperture of moderate size, the outer lip simple, acute, not thickened or reflected, rarely slightly expanded; pillar smooth, the inside of the outer lip not lirate or denticulate; canal varying in length usually somewhat tortuous or, when short, recurved; operculum filling the aperture, formed as in *Chrysodomus*. Radula like *Chrysodomus*, the minor cusps variable, the rhachidian tooth always cuspidate. Ovicapsules solitary, lentiform or hemispherical, attached by the whole of the flat side, usually with several enclosed young. Nepionic shells small, generally with the apical whorl inflated, the next succeeding somewhat constricted,and the rest regularly increasing; but the nucleus varies as previously described from inflated and irregular to blunt and regularly coiled, but always smooth." (Dall,1918).

Subgenus *Aulacofusus* Dall,1918. Type (by original designation), *Fusus spitzbergensis* Reeve. Proc. U.S.N.M. vol.54, p.217,1918.

" Another group of species, typified by *Fusus spitzbergensis* Reeve, has a special aspect due to the short canal and the prominence of the spiral ribs separated by chaneled interspaces. It may be called *Aulacofusus*."

Colus spitzbergensis (Reeve),1855. Circumboreal. Arctic Ocean to Northern Japan and Fuca Strait, 12 to 142 fathoms. (Dall). Johnson gives the Atlantic range " Labrador to the Gulf of St. Lawrence, 1-142 fathoms. Type locality, Spitzbergen. Atka Id., Aleutian Islands (W.J. Eyerdam).
Colus periscelidus Dall,1891. Commander and Aleutian Islands eastward to Sannakh Islands, Alaska. (Dall). Type locality, " off Akutan Islands,Alaska".
Colus herendeeni Dall,1902. Southern Bering Sea, Nunivak Island to the Aleutians and eastward to the Shumagin Islands, Alaska, 41 to 284 fathoms (Dall). Type locality, Bering Sea and Aleutian Islands.
Colus nobilis Dall,1919. Near Pribilof Islands, 60 fms.
Colus calameus Dall,1907. Western Bering Sea off Starichkoff Island, in 632 fathoms.
Colus ombronius Dall,1919. Eastern Bering Sea, from Nunivak Island south to Bristol Bay and the Pribilof Islands (Dall). Type locality, USFC Sta. 3252 in Bering Sea.
Colus bristolensis Dall,1919. Pribilof Islands north and east to Unimak Island,Alaska, 27 to 62 fathoms. (Dall). Type locality, USFC Sta. 3252 in Bering Sea.
Colus osychus Dall,1907. Point Barrow, Arctic Ocean, to Bering Island. Type locality off Bering Island.
Colus roseus Dall,1877. Off Cape Lisburhe, Arctic Ocean, 10 to 15 fms.

Colus barbarinus Dall,1919. Southern Bering Sea, off Khudubine Island,53 fms.
Colus sapius Dall,1919. Off Sitka, Alaska, in 1,569 fathoms.
Colus calathus Dall,1919. Near Shumagin Islands, 159 fathoms.
Colus capponius Dall,1919. Bering Strait near Port Clarence.
Colus acosmius Dall,1891. Off Pribilof Islands, Bering Sea (688 fathoms), to Unalaska (399 fathoms). Type locality, USFC Sta. 3329, off Unalaska Is., Bering Sea.
Colus halidonis Dall,1919. Pribilof Islands (81 fathoms) to Monterey Bay, California (633 fathoms). Type locality, off Destruction Island, Washington, in 516 fathoms.

Subgenus Limatofusus Dall,1918. Type (by monotypy), Colus tahwitanus Dall. No type was designated and no formal description of the subgenus given. The following is a description given of the species tahwitanus.

" Shell small, buccinoid, with about six whorls; nucleus eroded, suture deep, not appressed; whorls well rounded; sculpture of fine even uniform grooves with wider flat interspaces over the whole shell; periostracum dull, olivaceus; interior white, outer lip reflected, arcuate; pillar and body erased, axis twisted, almost pervious, canal very short and strongly recurved." Proc. U.S.N.M. vol.54,p.228,1918.

Colus trophius Dall,1919. Nicolas Island, Calif. ,1,100 fathoms.
Colus tahwitanus Dall,1918. Off Tahwit Head, Washington in 178 fathoms.
Colus morditus Dall,1919. Gulf of Georgia,. 60 to 200 fathoms.
Colus timetus Dall,1919. Bering Sea, off Unalaska, in 19 fathoms.
Colus dimidiatus Dall,1919. Off Tillamook Bay,Oregon, in 786 fathoms.
Colus severinus Dall,1919. Off Pigeon Point and Monterey Bay, Calif. in 278 to 296 fathoms. Type locality, Bay of Monterey, in 278 fathoms.
Colus pulcius Dall,1919.Arctic Ocean, north of Bering Strait (Healy).
Colus georgianus Dall,1920. Gulf of Georgia, in 60 to 200 fathoms (Dall) Petersburg, Alaska (Oldroyd); Chichagoff Island, Alaska (W.J.Eyerdam)
Colus halimeris Dall,1919. British Columbia to San Diego,Calif. in 60 to 822 fathoms. Type locality, USFC Sta. 4248 in Eastern Passage, near Stikine River, southeast Alaska.
Colus trombinus Dall,1919. Pribilof Islands, Bering Sea in 36 fathoms.

Subgenus Anomalosipho Dautzenberg and Fischer,Res. Camp. scientifiques de Monaco, livr. 37,1912,p.99. Type.- (fide Dall,1918), Sipho verkruzeni Dautzenberg and Fischer (not Kobelt)- Colus dautzenbergi Dall, Atlantic Ocean; Grand Banks.

" Shell solid, of moderate size, the nucleus unknown, the sculpture exclusively spiral, the sutures not constricted, the aperture shorter than the spire, the canal very short, wide, hardly differentiated from the aperture." (Dall,1918, Proc. U.S.N.M. vol.54, p. 218)

Colus martensi Krause,1885. Plover Bay, Bering Strait, 20 fathoms.
Colus adonis Dall,1919. Northern Japan, 25 to 508 fathoms.
Colus conulus Aurivillius,1885. Arctic Ocean north of Bering Strait. Circum-boreal ? (Dall). Type locality, Lat. 66 deg. 58' N, Long. 171 deg. 35' E (error for W?) 21 fms. (note by Dr. A.M. Keen).

Subgenus Latisipho Dall,1916. Type (by original designation), Chrysodomus hypolispus Dall,1891.

" Shell of moderate size, Buccinoid in form, with fine spiral striation or none; no axial sculpture; the periostracum persistent, smooth; the spire short, about equal to the aperture; the canal short,markedly recurved; the outer lip ample,simple,slightly reflected in the adult; the body and pillar callous, smooth; the siphonal fasciole strong with no chink between it and the columellar callus. Operculum as in Colus with apical nucleus. The nuclear whorls as in Colus but small" Dall,1918, Proc. U.S.N.M. vol.54, p.217.

Colus hypolispus Dall,1891. Arctic Ocean (Healy) to the Aleutian Islands and eastward to Shelikoff Strait, Alaska. (Dall). Type locality, U.S.S. Albatross Sta. 3254 in Bering Sea.

Collecting data: Izhut Bay, Afognak Islands, Alaska,1922 (Eyerdam)

Colus errones Dall,1919. Pribilof Islands, Bering Sea (18 fathoms), to Strait of Fuca (308 fathoms). (Dall). Type locality, Bering Sea.

Collecting data: Forrester Island, Alaska in 50 fms. (G. Willett); Port Frederick, Alaska (Kate Stephens); Wrangel Island, Alaska in 50 fms. (H.N. Lowe coll.); Wrangel Narrows and Chichagoff Island, Alaska (Eyerdam).

Colus halli Dall,1873. Nunivak Island, Bering Sea to San Diego, Calif. in 65 to 293 fathoms. (Dall). Type locality, Sanborn Harbor,Nagai.

Collecting data: Wrangel, Alaska in 50 fathoms (G. Willett); Hoonah, Chikagoff Channel, Alaska (Kate Stephens),

Colus jordani Dall,1913. Monterey Bay, Calif., 633 fathoms; Bering Sea 70-100 fathoms; British Columbia, 67-142 fathoms. (Dall). Type locality, Sucia Island, Gulf of Georgia, in 67 fathoms.

Collecting data: Petersburg, Alaska, 30-50 fathoms (G. Willett); San Juan Island, Puget Sound (Univ. of Washington) (G. Willett); Matia Island, Puget Sound (Oldroyd); Izhut Bay, Afognak Island, Alaska (W.J. Eyerdam).

Colus aphelus Dall,1890. Chirikoff Island, Alaska to San Diego, Calif. 290 to 626 fathoms (Dall). Type locality, in 414 fathoms off Santa Barbara county, Calif.

Colus halibrectus Dall,1891. Southern Berning Sea, near Unalaska Island, 351 to 399 fathoms.

Colus clementinus Dall,1919. Monterey Bay to San Diego, Calif., 339 to 704 fathoms. Type locality, between Santa Catalina and San Clemente Islands in 654 to 704 fathoms.

Colus dalmasius Dall,1919. Off British Columbia in 238 fathoms.

Genus Neptunea Roeding,1798. Type (by subsequent designation Monterosato,1872) Fusus antiquus monstr. contrarius Linnaeus. Dr. H.A. Rehder published two notes in the Nautilus regarding the type of Neptunea. See Nautilus vol.56, no.2, p.69,1942.

" Shell moderately large,elongate-ovate to subfusiform, ventricose; sculpture mostly spiral; outer lip usually simple; anterior canal of moderate length, slightly curved."

Subgenus Sulcosipho Dall,1916. Type (by original designation), Chrysodomus tabulatus Baird.

" Shell like Chrysodomus but more slender and elongate and with the whorl in front of the suture conspicuously widely sulcate or tabulate, the nucleus inflated and slightly oblique, the color whitish." (Dall,1918).

Neptunea tabulata (Baird),1863. British Columbia and south to San Diego, Calif. in 46 to 218 fathoms. Type locality, Esquimault Harbor, Vancouver Island.

Collecting data: Off Redondo Beach, Calif. in 75 fathoms mud and gravel bottom (Burch); off San Juan Islands, Wash. (T. Kincaid); Catalina Island, Calif. in 70-100 fathoms (G. Willett); Strait of Juan de Fuca, Wash. (Eyerdam); Orcas Island, Puget Sound in 30 fms. (Dr. Fred Baker); San Juan Id., Puget Sound (Lowe Coll.); San Pedro, Calif. (Lowe Coll.); Redondo Beach (Chaney).

Subgenus Neptunea s.s.

Neptunea amianta (Dall),1890. Pribilof Islands, Bering Sea, to Monterey Bay, Calif. 86 to 795 fathoms (Dall). to Lat. 34, Santa Barbara Islands. Type locality: near Santa Barbara Islands in 414 fathoms.

Neptunea insularis (Dall),1894. Pribilof Islands, Bering Sea, 184 fathoms. Kuril Islands (var.?) (Dall).

Neptunea onoodes (Dall),1907. Petrel Bank, Bering Sea, 54 fathoms. Also the Kuril Islands, 229 fathoms, (Dall). Type locality, in 229 fathoms, Okhotsk Sea.

Neptunea ithia (Dall), 1891. Off Monterey, Calif. 204 to 382 fathoms.

Neptunea smirnia (Dall),1919. From Nunivak Island to Fuca Strait, 57 to 114 fathoms. Type locality, Straits of Juande Fuca.

Collecting data: Victoria, B.C. (W.J. Eyerdam) also (Newcombe).

Neptunea nucea (Dall),1919. Arctic Ocean to Cook's Inlet, Alaska. Type locality, Cook's Inlet, Alaska.

Neptunea phoenicea (Dall),1891. Behm Canal, Alaska to Cascade Head,Oregon. . Type locality, U.S.S. Albatross Sta. 2862 off coast of British Columbia.

Collecting data: Wrangel, Petersburg, Forrester Island, Alaska in 40-50 fathoms (G. Willett); Petersburg, Alaska,1918 (W.J. Eyerdam).

Neptunea borealis (Philippi),1850. Arctic Ocean to Avacha Bay, Kamchatka, the Aleutian Islands and eastward to the Shumagin Islands, Alaska in 14 to 110 fathoms (Dall). Type locality:"Mare glaciale ad insulam Spitzbergen".

Neptunea pribiloffensis (Dall),1919. Near Pribilof Islands, Bering Sea, in 52 to 87 fathoms; south and east to Kodiak Island, Alaska, and the Queen Charlotte Islands, British Columbia. Also Japan. (Dall,1921). Type locality, off Pribilof Islands, Bering Sea, in 50-100 fathoms.

Collecting data: Wrangel, Alaska (G. Willett); Petersburg, Alaska in 50 fathoms (G. Willett); Unalaska Island, Aleutians, 1932 (W.J. Eyerdam).

Neptunea vinosa (Dall),1919. Western Bering Sea and Avacha Bay, 16 fathoms .

This species was omitted by Dr. A.M. Keen in " Abridged Check List" being considered outside of our area.

Collecting data: Vladivostock, Eastern Siberia,1928 (W.J. Eyerdam).

*** This is an extension of range southward about 2000 miles.

Neptunea satura (Martyn),1784. Arctic Ocean from Point Barrow to Bering Strait; Plover Bat, southand east to Cape Douglas, Alaska (Dall) to the mouth of Yenisei River, Arctic Siberia (W.J. Eyerdam in Nautilus, vol. 57 p.142). This was an extension of range westward from Alaska of over 3000 miles. The type locality has been stated to be " King George's Sound", Hudson Strait, Labrador by Mrs. Oldroyd. However, the observation was made by the editor in the preliminary discussion that it seemed odd that this species is not listed by any of the faunal lists of the Atlantic. Dr. A. Myra Keen made the following suggestion (Per. Comm. June,1945)

" King George's Sound" is obviously an incorrect type locality. There are several such sounds on the map. Mrs. Oldroyd assumed that one in Labrador was meant, but as you point out, this shell is not recorded from the Atlantic coast. There is a King George Sound in southwest Australia and a George Sound in New Zealand. As many of Martyn's shells of west America , notably the Calliostomas , were attributed to New Zealand, I suspect that the latter is the one he meant."

Collecting data: Bering Strait, Alaska (W.J. Eyerdam). Mr. Eyerdam states " I have several varieties of N. satura besides the typical but am not sure of their status." ; Punuk I., Ber. Sea (Lewis);Saruma Bay,Japan(Baker)

Neptunea satura behringiana (Middendorff),1848. Plover Bay, near Bering Strait. This species was omitted from the " Abridged Check List" by Dr. A. Myra Keen because it has not been reported on the American side of Bering Sea.

Dr. A. Myra Keen sends some interesting information regarding this species (Per. Comm. June,1945) " The description of Chrysodomus saturus

behringianus (Middendorff) on p. 233 of Oldroyd is identical with the one of Volutopsius beringi on p. 186 and applies to the latter. The correct reference follows:
(Tritonium (Fusus) antiquum L. var. behringiana Midd.,1848)
Bull. Acad. Imp. Sci. de St. Petersburg, Phys.-Math. Cl., vol.7, no.16, p.242; figured,1849, " Beitrage" zu Mal. Ross.",(Mem. Acad. Sci. St. Petersburg, ser.6, Sci. Nat. vol. 6) p.131, pl.2, figs. 3,4; pl.5, fig.1.
Original description:
" Testa rufescente,abbreviata; anfractibus laevigatus, supra conspicue applanatis; canali extus rugoso-striata; apertura mediocriter patula; cauda perbrevis, incurvata. Long. 60 mm, lat.(33)." Whorls 7. Type loc.: Sinus Tugur mar. Ochot.; ins. Schantar (i.e. Okhotsk Sea).

Neptunea satura elatior (Middendorff),1848. Norton Sound south to Unalaska Alaska. Dr. A. Myra Keen states regarding this species (Per. Comm. June,1945 " Unless the original description in the Bulletin differs very much from the " Beitrage" and " Sibirische Reise " usage, this name is unavailable as of Middendorff, for his proposal is of a " form" and is essentially non-binomial. In the " Beitrage" he speaks of " forma elatior A'" and elsewhere uses it in a descriptive rather than a nomenclatorial sense. I do not have access to the " Bulletin" descriptions."
Neptunea satura communis (Middendorff),1848. Point Barrow, Arctic Ocean, to Bering Strait. Dr. A.M. Keen remarks on this species " " Beitrage", p.460, pl.5, figs. 5-6, which was cited there as a variety but may be nomenclaturally valid."
Collecting data: Punuck Island, Bering Sea (Lewis) (G. Willett).
Neptunea satura tabularis (Dall),1919. Pribilof and Nunivak Islands, Bering Sea. Type locality, Bering Sea near Nunivak Island.
Neptunea soluta (Hermann),1781. MacKenzie River delta west to Point Barrow and south to Bristol Bay, Bering Sea. (Dall).
Neptunea soluta varicifera (Dall),1907. Smithsonian Misc. Coll. vol.50, p.154). Arctic Ocean, Okhotsk Sea to east coast of Sakhalin Island.
Dr. Dall figured this species in Bulletin 112, Pl.9, figs. 6,7 and gave the date as 1920 and only the Arctic range. Dr. A. Myra Keen omitted it from the " Abridged Check List" for that reason. We have the following note from Dr. Keen " Dall apparently overlooked his earlier description. Type Loc.: " Station 5021, on the east coast of Sakhalin Island, and various stations in the eastern part of Bering Sea". Hence, I should not have omitted it in the Check List."
Neptunea lirata (Martyn),1784. Icy Cape, Arctic Ocean, south to Japan on the west, to Puget Sound on the east; and off Point Pinos, California in 958 fathoms (Dall). Type locality given as " King Georges Sound" (see note on this locality under N. satura on p. 21).
Collecting data: Unimak and Kodiak Islands to Wrangel and Petersburg, Alaska , 0 to 50 fathoms (G. Willett); Strait of Fuca, Washington; Sitkalidak Island, Izhut Bay, Afognak Island, and False Bay, Unimak Island (W.J. Eyerdam); Port Graham, Cooks Inlet, Alaska (Dr. Fred Baker); Glacier Lake, Alaska (Mrs. Kate Stephens) (10 fms.).

Genus Searlesia Harmer,1916 (fide Zool. Record). Type (by original designation), Trophon costifer S.V. Wood.
Grant and Gale use Searlesia as a subgenus of the genus Kelletia.
" Shell solid, fusiform; apex blunt but not bulbous; ornamented by spiral lines or ribs and by strong longitudinal costae; canal usually short, open, straight or bending slightly to the left" (S.V. Wood).

Searlesia dira (Reeve),1846. Chirikoff Island,Alaska to Monterey,Calif. Type locality not given.

This is a common and rather variable species from northern California to Alaska.

Collecting data: Port Orchard, Puget Sound; De Poe Bay, Oregon; Crescent City, Calif. (Burch); Sitka to Forrester Island, Alaska (G. Willett); Bear Bay, Chirikoff Island,Alaska (Kate Stephens); Victoria, B.C. (K. Stephens); Newport, Oregon (Tretheway); Crescent City, Calif. (Chace); Bolinas, Calif. (Hemphill); Duxberry Reef, Calif. (Button); Victoria, B.C. (Kate Stephens).

Family BUCCINIDAE

Genus Buccinum Linnaeus,1758. Type (by subsequent designation,Montfort,1810), Buccinum undatum Linnaeus.

" Shell ovate or oblong, covered with a horny epidermis; spire elevated apex acute; aperture large, oval, emarginate in front; canal wide, very short or a mere oblique truncation of the base of the aperture; columella smooth; inner lip expanded; outer lip usually thin, smooth internally; operculum ovate, nucleus small near the outer front edge." (Tryon).

Mr . George Willetttof the Los Angeles Museum gave a report to the club in our Minutes #7, Jan. 1942 on the families Neptuneidae and Buccinidae. A brief summary of his talk was published. A few excerpts from that paper follow. " These two families were formerly combined under the family name Buccinidae, the older of the two names, but are now considered to have family characters. The principal external difference betweenthe two groups appears to lie in the operculum, which is larger with apical nucleus in Neptuneidae, and smaller with lateral nucleus in Buccinidae. In fact, the genus Volutharpa of the latter family, the operculum is so exceedingly small as to be practically imperceptible. In most species of Neptuneidae the outer lip is thin, while in Buccinidae it is frequently thickened andexpanded. The family name Chrysodomidae used by Dr. Dall in Bulletin is at least so far as Pacific Coast species are concerned, a synonym of Neptuneidae, the genus Chrysodomus being Neptunea.

The family Neptuneidae is largely boreal in distribution, exceptions being the genera Kelletia,Cantharus,Macron and Elilioidea , with a few species of other genera coming south as far as California in deep water. One example of these is Neptunea tabulata which may be found off our coast in fifty fathoms or more. It also occurs in Pliocene and lower Pleistocene deposits in southern California. Several species and races in this family, some of them of doubtful nomenclatural standing have been described from fossil faunas of various localities. An Atlantic species, Neptunea antigua, is used in Europe for both food and bait, being known commonly as the " red whelk" .

Two genera of Buccinidae are found on our coast, Buccinum and Volutharpa being restricted to northern latitudes, excepting for species that come farther south in deep water. One species, Buccinum strigillatum , has been taken off San Diego in 822 fathoms, and another B. viridum off the Santa Barbara Islands in 414 fathoms. Apparently no member of this family has been found fossil in California. The genus Buccinum is common in the north Atlantic,and at least one species, B. undatum is used for food. The shells of this genus are peculiarly liable to great variation in size,form and sculpture. This renders the classification of species very difficult."

Buccinum glaciale Linnaeus,1761. Circumboreal. Arctic Ocean to Fuca Strait. Johnson gives the Atlantic range " Greenland to Gulf of St. Lawrence"

Collecting data: Punuk Island, Bering Sea, 15 fms. (Lewis) (Willett); Sitkalidak Island, Alaska,1931 (W.J. Eyerdam)

Buccinum morchianum Dunker,1858. In Nautilus 50:101,102 Mr. George Willett published an article calling attention to the fact that B. baeri morchianum (Fischer) was really published in 1859 and was preoccupied by Dunkers species. This places the species described by Dall as Buccinum glaciale paralleelum in the synonymy of morchianum Dunker, and leaves the smooth form of baeri without a name. Mr. Willett elected not to rename B. baeri morchianum stating that the smooth form is of no significance.

Mr. Willett also pointed out the following " Mrs. I.S. Oldroyd (Stanford Univ. Publ. Geol. Sci., vol.2, part 1, p. 258) followed Dr. Dall in the use of the name morchianum (Fischer). In her plate 27, however, the two figures supposed to represent this form are really B. g. morchianum Dunker. This plate is further complicated by the fact that the numbers on the Buccinum figures and those on two figures of Chrysodomus saturus Martyn are transposed."

Range: Pribilof and Aleutian Islands to Cook's Inlet. Also Kuril Islands. (Dall for paralelium).

Buccinum hertzensteini Verkruzen,1882. Western Bering Sea near Avacha Bay in 58 fathoms.
Buccinum eugrammatum Dall,1907. Petrel Bank, Bering Sea in 42-54 fathoms. Figured by Oldroyd pl.14, fig.1.
Buccinum tenue Gray,1839. Circumboreal. Arctic Ocean southward to Kamchatka to the west , the Aleutian Islands to the east and thence to Fuca Strait. Johnson gives the Atlantic range " Labrador to the Gulf of Maine,42-92 fms. Greenland.

Collecting data: Godhaven, Greenland (Torrell) (Eyerdam).

Buccinum tenue rhodium Dall,1919. Plover Bay near Bering Strait, 8 to 25 fms.
Buccinum tenue lyperum Dall,1919. Southwest Bering Sea in 100 fathoms.
Buccinum plectrum Stimpson,1865. Point Barrow,Arctic Ocean south to Puget Sound. Circumboreal. (Dall). Johnson gives the Atlantic range "Gulf of St. Lawrence to Greenland.". Type locality not known.

Collecting data: Wrangell, Alaska in 50 fms. (G. Willett); Pavloff Bay, Alaska in 13 to 15 fathoms (Lewis) (Willett); Izhut Bay, Afognak Island and Sitkalidak Island, Alaska (W.J. Eyerdam); Chichagoff Island (Norberg).
Buccinum solenum Dall,1919. Bering Sea, Nunivak Island, to north of Unimak Island, in 36 fathoms (Dall). Type locality USFC Sta. 3518, off Nunivak Island, Bering Sea in 36 fathoms.
* Buccinum humphreysianum Bennett,1825. " Northwest America". (Pease*); exotic ? (Dall). Type locality, Harbor of Cork.

An obviously questionable species and omitted from most faunal lists.
Buccinum oedematum Dall,1907. Pribilof and Sannakh Islands, to Tahwit Head, Washington. Type locality, Sta. 3502 near the Pribilof Islands in 368 fathoms.
Buccinum polare Gray,1839. Arctic Ocean and south in Bering Sea to Avacha Bay,Kamchatka, on the west, and to Alaska peninsula on the east.(Dall). Type locality, Icy Cape, Arctic.

Collecting data: Cape Lisbourne, Arctic Ocean in 30 fms. (Lewis)(Willett Point Barrow, Alaska (W.J. Eyerdam).
Buccinum chartium Dall,1919. Off Pribilof Islands in 688 fathoms. Also Japan.
Buccinum pemphigus Dall,1907. Western Bering Sea, off Avacha Bay,682 fms.
Buccinum pemphigus major Dall,1919. Western Bering Sea and south to Japan in 100 fathoms.
Buccinum pemphigus orotundum Dall,1907. Nunivak,Pribilof,and Unimak Islands, Bering Sea. Type locality: Sta. 3254 north of Unimak Island,Bering Sea.
Buccinum viridum Dall,1889. Both coasts of Bering Sea from the Pribilof Ids southward to Santa Barbara Islands, Calif. in 414 fathoms.
Type locality, off Santa Barbara Islands, Calif.

Buccinum planeticum Dall,1919. From the Pribilof Islands, Bering Sea, to the Queen Charlotte Islands, British Columbia (Dall). Type locality, USF C Sta. 3305, southwest of Hagneister Island, Bering Sea.

Buocinum diplodetum Dall,1907. Off Sitka, Alaska, 1,569 fathoms, and Sea Lion Rock, Washington, in 877 fathoms. Type locality, off Sea Lion Rock,Wash.

Buccinum cnismatum Dall,1907. Bering Sea, north of Unalaska, in 300 fathoms.

Buccinum kadiakense Dall,1907. Kodiak Island, Alaska.

Buccinum bulimuloideum Dall,1907. Near the Shumagin Islands,Alaska in 159 fms.

Buccinum rondinum Dall,1919. Southeastern Bering Sea off the peninsula of Alaska, in 159 fathoms. (Dall).

Buccinum castaneum Dall,1877. Sannakh and Shumagin Islands, 20 to 41 fathoms. Type locality, Shumagin Islands in 20 fathoms.

Buccinum castaneum fluctuatum Dall,1919. Pribilof Islands to Unimak Pass and the Shumagin Islands, Alaska in 30 to 56 fathoms (Dall). Type locality, St. George Island, Bering Sea.

Buccinum castaneum triplostephanum Dall,1919. Kyska and Amchitka Islands, Aleutians, in 8 to 11 fathoms. Type locality, Aleutian Islands. Sitkalidak(E.

Buccinum castaneum incisulum Dall,1919. Unimak Pass, Aleutian Islands,56 fms.

Buccinum picturatum Dall,1877. Aleutian Islands eastward to Bristol Bay and Kodiak Island, Alaska, 5 to 60 fathoms.

Collecting data: Atka Island,Aleutians,1932 (W.J. Eyerdam).

Buccinum simulatum Dall,1907. Petrel Bank, Bering Sea, 43 to 54 fathoms. Also northern Japan. (Dall). Type locality, Sta. 4779, on the Petrel Bank, Bering Sea.

Buccinum ochotense (Middendorff),1848. (described as Tritonium). Bull. Acad. Imp. Sci. de St. Petersburg, Phys. Math. p.244; figured ,1851, Sibirische Reise, p. 235, pl.10, figs. 1-2, pl.9, fig.5.

Dr. A. Myra Keen advises regarding the reference " Incidentally, the correct title of the work Dall quotes as " Sibirische Reise" is : " Reise in den Aussersten Norden und Osten Sibiriens," Bd. II, Zoologie,Theil 1; Wirbellose Thiere".

Range: Arctic Ocean north of Bering Strait,and the Pkhotsk Sea.

Buccinum sigmatopleura Dall,1907. Commander and Attu Islands,Bering Sea in 135 fathoms. Type locality, Sta. 4792 off Bering Island.

Buccinum rossellinum Dall,1919. Southeast of Chirikoff Island, Alaska in 695 fathoms.

Buccinum strigillatum Dall,1891. Fuca Strait (178 fathoms) to San Diego (822 fathoms) and Guadelupe Island. (Dall). Type locality, off Guadelupe Island, Lower California in 167 fathoms.

Buccinum strigillatum fucanum Dall,1907. Straits of Fuca and Oregon coast. Type locality, Straits of Juan de Fuca in 125 fathoms.

Buccinum sericatum Hancock,1846. Arctic Ocean. Circumboreal. Johnson gives the Atlantic record as " Davis Strait- Circumboreal".

Buccinum normale Dall,1885. This species is generally listed as a subspecies Buccinum angulosum normale Dall,1885. Dr. A. Myra Keen notes the reference " Ray's " Polar Expedition" is : 48th Congress, 2nd Session, House Exec. Doc. 44. The type locality is Point Barrow."

Range as given by Dall is Point Barrow to Kotzebue Sound.

Collecting data: Point Barrow, Alaska (W.J. Eyerdam).

Buccinum physematum Dall,1919. Bernard Harbor, Arctic Coast, west to Point Barrow and south to Bristol Bay, Alaska. (Dall). Type locality, USFC Sta. 3253 in Bering Sea.

Buccinum angulosum Gray,1839. Bernard Harbor, Arctic Coast, west to Point Barrow and south to vicinity of Bering Strait. Type locality, Icy Cape.

Collecting data: Cape Lisbourne, Arctic Ocean in 30 fms. (Lewis) (G . Willett); Point Barrow, Alaska (W.J. Eyerdam).

Buccinum angulosum cnismatopleura Dall,1919. Proc. U.S.N.M. vol.56, p.328. Point Barrow, Arctic Ocean, Alaska and between Cape Beaufort and Cape Lisbourne Type locality, Point Barrow on the beach.

This species was omitted from Dall's list in Bull. 112 but the description is given in Oldroyd and figured pl.12, fig.4,

Collecting data: Point Barrow, Alaska (Brower).

Buccinum angulosum subcostatum Dall,1885. Note reference under B. a. normale Point Barrow, Alaska.

Buccinum angulosum transliratum Dall,1919. Point Barrowand southward to Bristol Bay. (Dall). Type locality, Port Belcher, Arctic coast of Alaska .

Collecting data: Point Barrow, Alaska (W.J. Eyerdam).

Buccinum fringillum Dall,1877. North end of Nunivak Island, Bering Sea.

Buccinum tenellum Dall,1883. Sea Horse Islands, Arctic Ocean, south to the Aleutian Islands. (Dall). Type locality, Cape Etolin, north end of Nunivak Island, Bering Sea,

Collecting data: Bering Sea; Arctic Ocean off Cape Lisbourne in 30 fath. (Lewis) (Willett).

Buccinum baerii (Middendorff),1848. (described as Tritonium) Bull. Acad. Sci. St. Petersburg, Phys. Math. Cl. vol.7, no.16,p. 243; figured 1849, in the Beitrage as cited by Dall (Dr. A. Myra Keen).

Range: Commander, Aleutian and Kodiak Islands. (Dall).

Collecting data: Aleutian Islands to Petersburg and Forrester Island, Alaska. The latter are more slender and higher spired (G. Willett); Prince William Sound and Kodiak Island (W.J. Eyerdam).

Buccinum fischerianum Dall,1871. St. George Island, Pribilof Group, Bering Sea.

Buccinum tenebrosum Hancock ,1846. Bering Strait. Circumboreal. (Dall). Type locality, west coast of Davis's Strait. Johnson gives Atlantic record as Davis Strait.

Buccinum ciliatum Fabricius,1780. Circumboreal. From Point Barrow,Arctic Ocean, south to the Aleutian Islands and eastward to the Shumagins. On the Atlantic from Greenland to the Newfoundland Banks. (Dall).

Buccinum ovulum Dall,1894. Amukhta Pass, Aleutians, in 248 fathoms.

Buccinum aleuticum Dall,1894. Near Unimak Island , 59 fathoms.

Buccinum percrassum Dall,1881. Arctic Ocean north of Bering Sea. Type locality, Bering Island.

Buccinum chishimanum Pilsbry,1904. Bering Island, Bering Sea. Also Japan. Type locality, Etoro, Chishima, Kuril Islands, Japan.

Genus Volutharpa Fischer,1856. Type (by monotypy), V. deshayesiana Fischer (= V. ampullacea (Middendorff).

" Shell ventricose, thin; spire short, body-whorl and aperture very large. Operculum usually wanting; when present, at first with apical nucleus, afterward becoming annular." (Tryon).

Volutharpa perryi (Jay),1855. St. Paul Island, Bering Sea (Palmer). Also Japan. Type locality, Bay of Yedo, Japan.

Dr. A. Myra Keen notes regarding the reference as follows : " Report of the Japan Expedition" is Senate Exec. Doc. no.79, 33d Congress, 2nd session, vol.12, pt. 2, 1844-1855."

Collecting data: Kii, Japan (W.J. Eyerdam).

Volutharpa ampullacea (Middendorff),1848. (described as Bullia). Bull. Acad. Imp. Sci. de St. Petersburg, Phys.-Math., Cl, vol.7, no.16, p. 246; figured , " Sibirische Reise",1851, p.237, pl.17, figs. 1-3. Range: Bering Strait to Fuca Strait (Dall).

Collecting data: Unalaska,Petersburg, Ketchikan, Alaska (G. Willett); Izhut Bay, Afognak Island,1922 and Shumagin Islands, Alaska,1925 (Eyerdam); Alert Bay, B.C. (Oldroyd); Bear Bay, Alaska; Abashiri,Hokkaido,Japan (Baker).

Volutharpa ampullacea acuminata Dall,1871. Am. Jour. Conch. vol.7, p.104. Type locality, Sitka, Alaska.

Collecting data: Sitkalidak Island, Alaska,1921 (W.J. Eyerdam).

Additions and Corrections

Dr. Joshua Baily Jr. advises regarding the type of Plicifusus . It is Fusus krøyeri. " A decision of the International Commission makes it necessary to preserve the diagonal line across the o in krøyeri."

Buccinum tenellum Dall in Kobelt,1883.

Conchylien Cabinet, ed.2, vol.3, pt. 1c(325), p.88, pl.91,fig.8.

The above is the correct reference for this species on the advice of Dr. A. Myra Keen. Check page 26.

The following species have not been reported north of San Diego but may be of interest. They are from the southern fauna and are discussed in Mr. A.M. Strong's notebook.

Genus Pyrula

Pyrula patula Broderip	Gulf of California to Panama.

Genus Hanetia

Hanetia pallida Broderip & Sowerby	Gulf of California to Panama
Hanetia anomala Reeve	Magdalena Bay to Peru
Hanetia fusiformis Blainville	Panama to Peru
? Hanetia modificata Reeve	Gulf of California
Hanetia elegans Dall,1908	Panama.

Genus Euthria

Euthria plumbeus Philippi,1841.	Chile

Genus Austrofusus

Austrofusus alternatus Philippi,1841.	Central America
Austrofusus fontainei d'Orbigny,1841.	Peru and Chile

Genus Metula

Metula amosi Vanatta,1913	Acapulco to Panama
Metula metula Hinds,1844	Central America

Genus Truncaria Adams and Reeve,1853.

Truncaria brunneocincta Dall	Panama

Family COLUBRARIIDAE

Genus Colubraria Schumacher,1817.

There seems to be no described species of this genus north of San Diego although Dr. Dall reported a Colubraria sp. from off La Jolla, San Diego County, Calif. in 199 fathoms. A number of species have been described from the southern fauna. However, there seems to be considerable disagreement about the proper position of a number of these species. The following list from Mr. A.M. Strong's notebook may be of interest.

Colubraria (Epidromus) jordani Strong	Socorro Island to South Seas
Colubraria (Epidromus) anomala (Hinds),1844.	Central America
Colubraria (Epidromus) reticulata (Blainville)	? Galapagos ? Mediterranean
Colubraria (Epidromus) sowerbyi (Reeve),1844	? Galapagos ? Red Sea
Colubraria aphrogenia Pilsbry and Lowe,1932.	Panama
Colubraria lucasensis Strong and Hertlein	Cape San Lucas.

Genus *Engina* Gray,1839. Type (by subsequent designation, Gray,1847), *Engina zonata*. Reference- Bartsch,1931, Proc. U.S.N.M. No. 2881, vol.79, Art. 15, pp. 1-10, pl.1 " Descriptions of New Marine Mollusks from Panama With a Figure of the Genotype of Engina". The figures in this paper are good and should be studied by all interested in this group.

" Shell ovate-conic; spire sharp, with longitudinal nodulous ribs, decussated by revolving lines; aperture narrow, with several oblique plications in front; outer lip rather thick, inflected or callous in the middle, crenulated within" (Tryon)

Engina maura (Sowerby),1832. Proc. Zool. Soc. London for 1832, p.117. Reference- Pilsbry and Lowe, Proc. Acad. Nat. Sci. Philadelphia, vol.84, p .63 pl.7, figs. 1 & 2. This is the species listed by Dall and many others as *Engina carbonaria*(Reeve). Pilsbry and Lowe state of this species :

" The neotype from Gardner Bay, Hood Island, Galapagos (No. 153525 ANSP) here figured measures 19.3 mm. long, 12.2 wide, being almost exactly the size of Sowerby's type (0.8 x 0.5 inch). It is black, with a few small whitish and yellow spots. Sculpture of coarse rounded axial ribs, 8 on the last whorl, crossed by 8 or 9 spiral cords which form elongate tubercules on the ribs and are almost obsolete between them; three of these cords are larger on the prominent peripheral region, a subsutural cord and those below the periphery being smaller. The intervals between the cords are distinctly striate spirally. The aperture is bluish white. Within the outer lip there are six teeth. The second and third from above being connected and prominemt. On the columellar and parietal margin there is a series of smaller tubercles and wrinkles."

Range: Dall gives the range of the species as San Pedro, Calif. to Panama and the Galapagos. To Manta, Ecuador (Stearns, Proc. USNM, 14, p . 317) noted by the -4 lat. in Keen's " Abridged Check List".

However, we are hesitant about listing the collecting records for this species off the California coast because of the general feeling as stated by Mr. George Willett of the Los Angeles Museum " I think Dall's records for *carbonaria* probably are referable to *strongi*."

However, the following collecting records by H.N. Lowe are no doubt correct : San Juan del Sur, Nicauragua; Manzanillo,Mexico; Puntarenas, Costa Rica; Montijo Bay and Taboga Island, Panama. W.J. Eyerdam records the species from Corinto, Nicauragua in 1939.

Engina strongi Pilsbry and Lowe,1932. Proc. Acad. Nat. Sci. Phila. vol. 84, p. 65, pl.16, fig.12. Type locality off Catalina Island, Calif. in 50 fms. Range: Catalina Island, Redondo Beach and San Diego, Calif.

" The shell is solid, fusiform, ivory yellow, marked with carob-brown spots on the right side of each axial rib. Nucleus lost. Sculpture of slightly retractive axial ribs, 10 on the last whorl, crossed by subequal, rounded spiral cords more prominent on the ribs, thirteen on the last whorl, three on earlier whorls; in the type a spiral thread running between first and second cords. Aperture white, passing into a rather narrow canal below. Outer lip thick, with about six rounded tubercles within. Inner lip with a low fold near the posterior angle and a very small one above the angle defining the anterior canal."

Collecting data: Catalina Island, Calif. in 50 fathoms (H.N. Lowe); Redondo Beach, Calif. in 25 and also 50 fathoms (Burch); San Diego, Calif dredged (Gripp).

The following list of species of the genus Engina covers the entire coast. It is taken from Mr. A.M. Strong's notebook.

Engina strongi Pilsbry and Lowe,1932.	Redondo Beach,Catalina, and San Diego.
Engina ferruginosa (Reeve),1846.	Lower Calif. to Panama.
Engina senae Pilsbry and Lowe,1932.	Gulf of Calif. to Acapulco.
Engina rufonotata (Carpenter),1864.	Gulf of Calif. to Magdalena Bay.
Engina pulchra (Reeve),1846 (reeveana C.B. Adams)	? Gulf of Calif. to Panama.
Engina maura (Sowerby),1832.	San Pedro, Calif. to Manta, Ecuador.
Engina jugosa (C.B. Adams),1852.	Panama.
Engina contracta (Reeve),1846.	Panama to Ecuador.
Engina pyrostoma (Sowerby),1832.	Panama.
Engina livida (Sowerby),1832.	Panama
Engina heptagonalis (Reeve),1846.	Panama
Engina tabogaensis Bartsch,1931.	Panama
Engina panamensis Bartsch,1931.	Panama
Engina litharium Dall	Galapagos
Engina mantaensis Bartsch,1928.	Ecuador
Engina earlyi Bartsch & Rehder,1939.	Galapagos

Genus Caducifer

Caducifer crebristriatus Carpenter,1856.	Panama.
Caducifer tabogaensis Pilsbry & Lowe,1932.	Panama
Caducifer thaleia Pilsbry & Lowe,1932.	Galapagos.

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Professor Louis Brand, University of Cincinnati, Cincinnati 21, Ohio sent the following letter :

The following is a partial list of the shells collected by my daughter Mrs. Sara Br and Marcy at Arica, Chile (1944-45). Besides these there are a number of species of Fissurella and Acmaea that I have not determined; also some small bivalves. Pecten purpuratus Lamarck was not found at Arica but my daughter obtained single valves of this species from Iquique,Chile.

Concholepas peruviana Lamarck
Cymatium rude Broderip
Calyptraea trochiformis Gmelin
Calyptraea strigata Broderip.
Discinisca lamellosa Broderip
Fissurella crassa Lamarck
Fissurella nigra Lesson
Fissurella concinna Philippi
Fissurella darwinii (?) Reeve
Fissurella exquisita (?) Reeve
Littorina peruviana Lamarck
Mitra chilensis Kiener
Murex crassilabrum Gray
Nassa escalae Philippi
Thais biserialis Blainville
Thais chocolata Duclos
Turritella cingulata Sowerby
Oliva peruviana Lamarck
Tegula atra Lesson
Scurria scurra Eschscholtz

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Mr. W.J. Eyerdam, 7531 19th Ave., N.E., Seattle 5, Washington "I note that you will publish a list of the marine shells collected at Arica, Chile by the daughter of Dr. Louis Brand. This is of interest to me because I spent three days there and collected a few shells, although at the time I was there the tides were not very good. I am sending you a list of 24 species of shells that I took at Arica and hope you will include them together with the list you intend to print next month.

The beach at Arica is very sandy but at extreme low tide, outer reefs are partially exposed. The most conspicuous land mark on the shore is the great Morro Rock where the Peruvian garrison was routed and almost annil--iated by the ferocious onslaught of the Chilean soldiers in the Tacna-Arica war."

Marine Shells Collected at Arica, Chile in February,1938 by W.J.Eyerdam

Mytilus magellanicus Roeding
Mytilus algosus Gould
Brachidontes purpuratus Lamarck
Brachidontes granulatus Hanley
Marcia rufa Lamarck
Protothaca thaca Molina
Semele solida Gray
Mulinea edulis King
Chiton latus Sowerby
Enoplochiton niger Barnes
Metomura echinata Barnes
Tonicea (Fannettia) disjuncta Frembly
Fissurella limbata Lesson
Fissurella latemarginata Sowerby
Scurria parasitica d'Orbigny
Tegula (Chlorostoma) atra Lesson
Tegula (Chlorostoma) tridentata Pot. Mc
Crepidula dilatata Lamarck
Trochita radians Lamarck
Turritella ungulata Lamarck
Thais (Stramonita) biserialis Blain .
Mitra (Atrimitra) maura Broderip
Oliva peruviana Lamarck
Discinisca lamellosa Broderip

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Note from Thomas A. Burch " Figure 465 labelled Mactra nasuta in John--son and Snook " Seashore Animals of the Pacific Coast" is definitely not M. nasuta , and is undoubtedly a species of Spisula."

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New Publications Received.

Nautilus Vol. 58, No.4, April,1945. There are several papers in this issue of particular interest to us. Dr. Joshua L. Baily Jr. gives a very clear discussion of the matter we handled under Carditidae. The title of the paper is " Cardita (Cyclocardia) longini, new name for Venericardia (Cyclocardia) nodulosa Dall,1919.". This is the species that we called Cardita bailyi for which this writer owes Dr. Baily an apology for not first asking him to suggest a new name because we were entirely indebted to Dr. Baily for the information that C. nodulosa Dall was preoccupied. If it were as simple as withdrawing the motion in parliamentary proceedure that would gladly be done. However, the interesting fact remains that there were something like 1200 copies of the first papers distributed literally all over the world. Between us we seem to have named it very thoroughly. About the only redeeming feature of the affair seems to be that the species is so exceedingly rare that very few collectors will ever have occasion to be concerned about giving it any name at all.

An interesting note by Dr. Pilsbry calls attention to the fact that Tellina panamanensis Li ,1930 was evidently intentionally spelled that way and therefore is not homonymous with Tellina panamensis Philippi,1848. Therefore the name Tellina liana Hertlein and Strong,1945 was not needed and will be synonymous with panamanensis Li.

The description of Stenacme floridana, new genus and new species is interesting. Dr. Pilsbry states that it is closely related to the Amphibola of Australia,New Zealand, South Africa etc.

The Journal of Conchology, vol.22, no.6, May 31,1945 , the organ of the Conchological Society of Great Britain and Ireland has been received. Among the several fine papers in this issue there are none touching our west American fauna particularly. There is an interesting account of Edgar Allan Poe's " Conchologist's First Book" by Colin Matheson.

Mollusca, vol.1, no.5, June 10,1945, published by Paul H. Reed, Tavares, Florida is at hand. Dr . W.J. Clench has a good paper dealing with the Harvard Navassa Expedition. Dr. Henry van der Schalie has a paper on " What has happened to snails of the genus Io." And a newcomer to the current writers is D.H. Kennelly, Port Elizabeth, South Africa with an account of " Shell Collecting in South Africa".

ADDITIONS AND CORRECTIONS

Minutes #50 pp 5 to 10 inc.

After cutting the stencils on the genus Fusinus we received the following letter from Mr. Allyn G. Smith. His conclusions will be of special interest to compare with the opinions offered in the first papers.

" Classification of Fusinus into subgenera can be done best by careful examination of the nuclear whorls, more or less following Grabau. We think most of our West Coast species found north of San Diego fall into two subgenera- Aptyxis and Barbarofusus. Aptyxis, type F. syrcusanus (from the Mediterranean) includes F. luteopictus and F. taylorianus from the Gulf. Barbarofusus,which is characterized by a bulbous , overhanging nucleus, includes F. barbarensis (the subgeneritype), F. arnoldi, F. kobelti, F. monksae, and others. We have found it difficult to find specimens that show the characteristic Barbarofusus nucleus as most specimens have the tip of the shell eroded or missing, or covered with coralline. Lower Californian Fusinus species- that is, some of them- fall into other subgenera that are not a part of the present problem. The following brief comments may give you an idea of our present views.

F. arnoldi (Cossmann),1903.
This is a common fossil from the Upper San Pedro Series, Pleistocene. As the type of F. robustus Trask was lost in the San Francisco fire of 1906, and as Cossmann did not designate a new type, we propose to designate a neoholotype from the Stanford Collection collected by Delos Arnold, and figure it. Arnoldi and barbarensis are two totally distinct species, not at all related, as stated by Grant and Gale. Also, we think that true arnoldi has so far been found only as a fossil. There are living species that are related, and furthermore we have examined a fossil lot that are undoubtedly intermediate between arnoldi, as we restrict it, and the common Monterey Bay species. There is no good figure of what we call arnoldi, which is a fairly large shell, somewhat tabulate, and heavily nodose, especially on the early whorls. Arnold's Pl.4, Fig.7 is a fairly good one, however.

F. barbarensis (Trask), 1855
Dall, Arnold, and Grant and Gale all agree on this species as being long-spired and having a long canal. Arnold's figure is very poor. It was first found fossil at Santa Barbara and the type appears to have been lost in the San Francisco fire. So we propose to designate a neoholotype which I fortunately found in my collection taken from the " Bath-House Beach" formation at Santa Barbara. It agrees very closely with the description. Barbarensis is found living off the southern California coast, very large ones being taken by Tremper off Newport. It extends down the Lower California coast as indicated by a large number of specimens dredged by the Crocker Expedition. These appear to be enough different to warrant a subspecific name. Localities for barbarensis include the following:
35 fms. off Newport (Tremper)
90 fms. off Avalon
85 fms. in the Santa Barbara Channel
250 fms. off Santa Cruz Island
40 fms. off Point Vicente
63-80 fms. , gravel, Monterey Bay; scarce.

F. kobelti (Dall),1877.
There is a problem here, The description calls for a whitish shell with brown lines, which seems to answer to the shells dredged off Catalina and, so far as we have been able to determine, nowhere else. I enclose a photo of a fine living specimen from the W. J. Raymond Collection. Dall also fi-

of a fine living specimen from the W.J. Raymond Collection. Dall also figured it (Proc. USNM 14:177, pl.6, fig.4, 1891). The brown lined shell is not found at Monterey, which leads us to suspect that Dall may have referred to more than one species in his description. If, on investigation, the type of kobelti in the U.S. National Museum, said by Oldroyd to come from Monterey, is actually the Monterey species and not what we have been calling monksae up to this time, then the Monterey species becomes kobelti, and the Catalina species is open for a new name, as it appears distinct. I know of no fossil kobelti like those from Catalina.

F. monksae Dall,1915.

New name for F. rugosus Trask, the type of which was also lost in the San Francisco fire. Named originally froma fossil. We propose to select a neoholotype from a fine lot collected by G. Willett from the Hilltop Quarry formation, where it appears to be common. As we understand it, monksae has a very heavy shell, with short spire and canal, and with a relatively rough sculpture following Trask's idea when he called this species rugosus. What we now call monksae is not at all like the Monterey species. Related species are your shells from off Redondo and kobelti from Catalina. It is found living as well as fossil and we now have on loan from George Willett three specimens he dredged in 30 fathoms off Catalina. I believe the Bormanns also have found dead shells on shore.

Fusinus (new species)

This is the Monterey species to which we have assigned a ms. name. It is the living representation of the fossil arnoldi. There is a southern race from San Pedro that appears to be rare in collections that we think may be enough different to warrant a subspecific name, and so we have tentatively assigned one. The animal is a brilliant red when alive, but it fades out in alcohol.

Fusinus (new species)

This is the species you dredge commonly off Redondo. It seems distinct enough from monksae (as we understand it), and from the Catalina kobelti to warrant a new species name, which we have assigned in our ms.

F. luteopictus Dall,1877

Subgenus Aptyxis. This is so well known that there is little further to add except that the northern limit so far seems to be Monterey.

F. harfordii (Stearns),1871.

The type is said to have come from " Big Spanish Flat". I don't know for sure where this is but I have assumed it to be at or near Little River, Mendocino Co. I would follow Dall in putting it in the subgenus Harfordia until better evidence is at hand that it belongs in one of the other groups. It is rare and pretty distinct as species of Fusinus go. We found 7 or 8 live ones after much diligent hunting during minus tides at Union Landing and at Albion. The animal is bright red and this is the thing to look for in trying to collect it. Once you know what you are looking for there is no possibility of confusing them with Searlesia dira , which has no shaggy periostracum and is found farther inshore.

F. diminutus Dall,1915.

According to Mackenzie Gordon, who examined the types of both species in the National Museum, this is Ocenebra lurida munda Dall. I think we can safely throw out diminutus.

F. taylorianus Reeve,1848.

Another species in the subgenus Aptyxis. It is much like luteopictus, but evidently distinct from it. Lots I have seen in the C.A.S. collection, sp. labelled, all come from the Gulf of California and I doubt its occurance in California. California records are, I suspect, misidentifications of luteopictus.

Metzgeria californica Dall,1903.

No comment except that it must be rare. We have one single shell from Monterey that seems enough different to name, so it is described and figured in our Monterey paper.

So much for comments on Fusinus, which, as I said should be considered as tentative and preliminary. I won't guarantee we won't change our minds later. It is quite possible we have gone too far in assigning new species and that it would be better to describe the new ones indicated above as subspecies under fossil species already named and from which the living species are derived. It will be of much interest to have the comments of Willett, Strong, Baily and others on this problem. I shall look forward to what they have to offer, in addition to your own and Tom's conclusions.

Editors Note- The above preview of the report to be made on the Monterey fauna is sincerely appreciated. For the past several years most of us have been disposed to simply label our specimens of Fusinus with question marks pening the completion of the study of Allyn and Mac Gordon. The conclusions reached sound as if we will have something to guide us in this group when this paper is published and we trust it will be soon.

This Fusinus matter is a good place to call attention to one of our problems. Different members of our club and correspondents no doubt have the same species classified under several entirely different species. The result is that when they write in their collecting records for these papers many of the conclusions are necessarily somewhat questionable. It seems to be a logical suggestion that students should have the free priviledge of questioning any of the records listed in these papers. As far as the editor is concerned he will be glad to submit any specimen listed for study and identification. Before we publish our final report it may be a good suggestion to have a committee appointed for the purpose of passing on specimens that have been the basis of questioned or surprising locality records. In this connection Mr. George Willett recently handed the editor a list of collecting records and data listed in our work on the pelecypods that he thinks should be definitely determined or rechecked. They follow.

Yoldia siliqua -- Cape Simpson, B.C. (Lowe)
Martesia intercalata -- Long Beach and San Pedro (Lowe)
Thyasira gouldii-- British Columbia
Psephidia ovalis -- Hawk Inlet, Alaska (Kate Stephens)
Modiolaria corrugate -- Unalaska (Eyerdam)
Thracia curta -- Prince William Sound
" beringi -- Unalaska and Atka Islands
Cardita alaskana -- Afognak I.
" " paucicostata -- Atka I.
Thyasira gouldii-- Prince William Sound
Taras aleuticus -- " " "
Cardium californiense -- Alaska records
Psephidia ovalis -- Prince William Sound
Macoma middendorffii -- Atka I.
" inquinata arnheimi -- Akutan; Kodiak

Panomya ampla -- Puget Sound
" beringiana -- Unalaska
Mya truncata uddevallensis (I have specimens of probably what has been referred to this form, but consider them only individual variants of truncata.)

Also, I should like to see specimens of Transenella tantilla from from Alaska, and Glycymeris corteziana from Alaska and Puget Sound.

Alaska records for Lyonsia californica attributed to me, are incorrect. I did not collect that species in Alaska.

Allyn Smith is probably right in believing that Crenella divaricata does not come into our territory. Southern California shells are probably a small race of C. decussata.

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Mytilus edulis diegensis Coe,1945. Minutes #48 p 28

Dr. W.R. Coe has given us the following additional descriptive data on this new subspecies.

" Because of the great variability in the shape of the shell (see Minutes #41) due in part, at least, to environmental conditions, the most reliable criteria for distinguishing the species,subspecies and varieties of the Mytilus edulis group appear to be the characteristics of the lunule and the number and shape of the lunular ("hinge") teeth (See Lamy, Jour. Conch., 80,1936). In the subspecies diegensis which has become so abundant of latethe lunule is narrow and composed of usually 3 cornucopia-shaped ridges, with usually 2-4 teeth. The modal number is 3. In typical M. edulis of the Atlantic coast the lunule is broad, with usually 4-6 or more ridges and teeth. The modal number is 5. There is of course some overlapping; hence the shape of the shell must also be taken into consideration. Shell of typical M. edulis is commonly more nearly cylindrical and more often with ventral side incurved." Wesley R. Coe.

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Family NASSARIIDAE

Genus Nassarius Dumeril,1805. Zool. Analytique, p.166,1806, genus without species; Froriep's translation, p.167,1806, only species added, Buccinum arcularia, fide Iredale, Proc. Malac. Soc. London, Vol.12, pp. 80,81,82,1916. Type (by monotypy) (Froriep Translation),1806, Buccinum arcularia Linnaeus.

" Shell rather ovate, spire produced; sculpture variable; aperture ovate; anterior canal abruptly truncated and deeply notched; a basal constriction on the exterior of the body whorl usually prominent."

Dr. Dall used the family name Alectrionidae with the genus Alectrion Montfort,1810 and type Buccinum papillosum Linnaeus. This usage has been very generally rejected. The type of the genus Alectrion is said to be very different from any of our west coast species. Discussed by Grant and Gale,1931, p.672. Arcularia Link,1807 has been used by a number of authors. However, it is an absolute synonym of Nassarius. The consensus of opinion at this time is to accept Nassarius. However, this problem is still a mooted matter. Dr. W.P. Woodring (Per. Comm. July,1945) advises " Though I have used Nassarius as a substitute for Lamarck's Nassa, that usage is of doubtful validity) See Pilsbry and Lowe, Proc. Phila. Acad. Nat. Hist. vol.84, p.68,1932). For the time being I prefer to use " Nassa" (U.S. Geol. Survey Prof. Paper 190),p.26,1938; Prof. Paper 195, pp. 86-87,1941). It may be pointed out that " Nassa" tegula represents Nassarius proper and that Schizopyga is available for " Nassa" fossata, "N" cerritensis, " N" perpinguis and allies". However, Nassarius Dumeril was presumably proposed as a substitute for Nassa Lamarck and seems to be accepted by the majority of recent authorities. Dr. A. Myra Keen (Per. Comm. July,1945) states "Until such time as some one makes a careful evaluation of this family, I suggest that for our west coast forms, Nassarius in the broad sense be used except for subgenus Schizopyga for the californiana-perpinguis-fossatus groups and Nassarius s.s. for N. tegula which is very close to the type ,N. arcularia." Re Dr. Woodring's comments: I do not feel the same reluctance about accepting Nassarius. After restudying the Dumeril in Froriep proposal I still regard it as a valid name, not an emendation of Nassa."

We will take up a more detailed discussion of the subgenera and species involved in our fauna north of San Diego following a key to some of the species of the coast and a list taken from Mr. A.M. Strong's notebook.

Adult shell with a heavy callus about the aperture
. Axial ribs rising to prominent nodes
.. Whorls with a single row of nodes on the shoulder
... Expanded callus of inner lip orange
    30 x 30 mm Gulf of Calif. to Chile .... luteostomus
    Tryon 4:39, pl.12, fig. 165; Reeve, pl.10, fig. 63.
... Expanded callus of inner lip white
.... Shell dark, sometimes with a yellowish band
    San Francisco to San Diego .... tegulus
.... Shell whitish, brown spots below the suture
    Magdalena Bay to Panama .... tiarulus
    Reeve , pl.14, fig.92.
.. Whorls with 2 rows of nodes between the sutures
    20 x 11 mm San Diego to Gulf of California ...... noduliferus
. Axial ribs granular
... Ribs obliquely granular on upper whorls
... Shell ash colored with a yellowish band
    12.5 x 7.5 Panama to Peru .... complanatus
    Tryon, vol.4, p.33; Reeve, pl.17, fig. 111.

.... Expanded callus brown
16 x 9 mm. Gulf of California .... moestus
Nautilus, vol.7, p.10.
... Shell yellowish brown Gulf of Calif. to Peru ... major
Proc. USNM, vol.17, p. 181.
... Shell pale violet with darker bands
Gulf of California .... iodes
Proc. USNM, vol.51, p. 577
.. Ribs flexuous, granulated at the suture
18 x 9 mm. Panama to Peru .... exilis
Tryon Man. Conch., vol.4, p.32; Reeve, pl., fig.101.
. Axial ribs not nodulous or granular
.. Spiral sculpture of fine striae
13.5 x 7.5 mm. Gulf of California .... crebristriatus
.. Spiral sculpture of strong threads
14 x 7 mm. Central America to Panama .... scabriosculus
Tryon, vol.4, p.46; Reeve, pl.26, fig. 174.
Callus thin or absent in the adult
. Axial ribs faint or present on early whorls only
.. Spiral sculpture of granular ridges
30 x 20 mm. Vancouver to Cerros Island ---------- fossatus
.. Ridges smooth, strong toward the base
20 x 9 mm. Peru .... planicostatus
Tryon 4-34, pl.10, fig.102; Reeve, pl. fig.76.
.. Spiral sculpture of fine grooves
2- x 12 mm Point Arena to Cerros Island ...... insculptus
Callus thin or absent in the adult
. Axial ribs and spiral cords forming an evenly reticulated sculpture
.. Spirals between sutures four
... Sutures channeled
6 x 5 mm. Cerros Island to Panama .... onchodes
Proc. USNM, vol.51, p.577
... Sutures not channeled
20 x 11.5 mm. Panama .... miser
Bull. Mus. Comp. Zool., vol. 43, p.307
... Spirals between sutures five
Acapulco to Magellan Straits .... taeniolatus
Tryon, vol.4, p.57, pl.18, fig.273.
.. Spirals between sutures six
... Axial ribs about 16
9 x 4.5 mm. Galapagos .... exsarcus
Bull. Mus. Comp. Zool., vol. 43, p.308.
... Axial ribs about 20
.... Axial ribs oblique
23 x 12 mm. Puget Sound to Cerros Island .... perpinguis
.... Axial ribs not oblique
14 x 8.5 mm. San Miguel Island to Panama .... catallus
Bull. Mus. Eomp. Zool. vol.43, p.307.
... Axial ribs about 25
31 x 14 mm. Oregon to San Ignacio Lagoon .... californianus
. Axial ribs predominating in strength
.. Whorls strongly angulated
... Two sharp, narrow sulci between sutures
5.3 x 3 mm. Gulf of California .... limacinus
Proc. USNM, vol. 51, p. 577.
... Four low, flat, spiral ridges between sutures
5.5 x 4 mm. Galapagos .... gonioplourus
Bull. Mus. Comp. Zool. vol.43, p.308.

List of species of Nummarius

Nummarius fossatus Gould,1849. Vancouver to Cerros Island
Nummarius insculptus Carpenter,1864. Point Arena to Cerros Island.
Nassarius perpinguis Hinds,1844. Puget Sound to Cerros Island.
Nassarius californianus Conrad,1856. Oregon to San Ignacio Lagoon
Nassarius cooperi Forbes,1850. Puget Sound to San Diego.
Nassarius mendicus Gould,1849. Alaska to Magdalena Bay.
Nassarius cerritensis Arnold,1903. Long Beach to Gulf of California
Nassarius nodicinctus (A. Adams),1851. San Diego to Panama.
Nassarius catallus Dall,1908. San Miguel Island to Panama
Nassarius onchodes Dall,1917. Cerros Island to Panama.
Nassarius dentiforus (Powys),1835. Cerros Island to Peru
Nassarius teschudii (Troschel),1852. Cerros Island to Peru.
Nassarius versicolor (C.B. Adams),1852. Magdalena Bay to Peru.
Nassarius pagodus (Reeve),1844. Gulf of California to Panama.
Nassarius moestus (Hinds),1844. Gulf of California to Chile.
Nassarius corpulentus (C.B. Adams),1852. Gulf of California to Panama.
Nassarius limacinus (Dall),1907. Gulf of California.
Nassarius angulicostis Pilsbry & Lowe,1932. Gulf of Calif. to Panama.
Nassarius guaymasensis Pilsbry & Lowe,1932. Guaymas.
Nassarius taeniolatus (Philippi),1845. Acapulco to Chile
Nassarius gemmulosus (C.B. Adams),1852. Acapulco to Panama.
Nassarius nucleolus (Philippi),1845. Acapulco to Panama..
Nassarius mystiricatus (Hinds),1844. Acapulco tp Panama.
Nassarius miser(Dall)1908. Acapulco to Panama.
Nassarius gallegosi Strong & Hertlein Gulf of Calif. to Central America.
Nassarius polistes Dall,1917. Panama and Galapagos.
Nassarius stimpsonianus (C.B. Adams),1852. Panama.
Nassarius nodiferus (Powys),1835. Panama and Galapagos
Nassarius exsarcus Dall,1908. Galapagos.
Nassarius goniopleurus (Dall),1908. Galapagos
Nassarius townsendi (Dall),1908.
Nassarius planicostatus (A. Adams),1851. Peru.
Nassarius gayii (Kiener),1835. Peru and Chile
Nassarius escaleus (Philippi),1860. Chile.
Nassarius tegulus (Reeve),1853. San Francisco to San Diego.
Nassarius noduliferus (Philippi),1848. San Diego to Gulf of California.
Nassarius tiarulus (Kiener),1834. Magdalena Bay to Panama.
Nassarius luteostomus (Broderip & Sowerby),1829. Gulf. of Calif. to Chile.
Nassarius crebristriatus (Carpenter),1857. Gulf of California.
Nassarius major (Stearns),1894. Gulf of Calif. to Panama.
Nassarius iodes (Dall),1917. Gulf of California.
Nassarius scabriusculus (Powys),1855. Central America to Panama.
Nassarius complanatus (Powys),1835. Panama to Peru. Corinto.
Nassarius exilis (Powys),1835. Panama to Peru.
Nassarius festivus (Powys),1835. Panama to Ecuador.
Nassarius paposanus (Philippi),1860. Chile.
Nassarius spartus (Marrat),1897. Chile.
Nassarius braneostomus (Stearns) San Felipe.

Genus *Nummarius* Dumeril,1805.

The *difficulties* involved in an attempt to allocate the west coast species to subgenera are so close that we propose here to consider them all *Nassarius* with the exception of the *Schizopyga* Conrad group.

Nassarius tegulus (Reeve),1853. San Francisco, Calif. to San Ignacio *Lggoon, Lower Calif.* (Jordan). Type locality not given.

Description of this very common species is unnecessary. However, Grant and Gale state that the southern specimens have heavier axial sculpture and tend to probably grade into *N. luteostoma* (Broderip & Sowerby). Our experience has been to find specimens *of this* species taken from the Estero de Punta Banda below Ensenada, Mexico somewhat more slender than typical sputhern California shells. The Estero race is clearly the species though and in our opinion not worth giving a varietal name. Our experience has been to find this a bay form and very common in such localities as Newport Bay, Anaheim etc. However, we have never picked it up in our dredged in the open sea at any depth. (Burch).

Collecting data: From Alamitos Bay, Calif. to Scammons Lagoon, L.C. and Santo Domingo, L.C. (Lowe); Orcutt reported the species from Guaymas ?

Nassarius nodicinctus (A. Adams),1851. Galapagos Islands.

Dr. Dall *listed* this species from " San Diego to Panama and the Galapagos Islands". However, we propose to drop it from our faunal list. The consensus of opinion is well stated by Mr. A.M. Strong as follows: " This is a well marked species in the Galapagan fauna. There are no recent records from any other locality, though Carpenter lists it from the Gulf of Calif, probably an error, and nothing like it is known from San Diego."

The H.N. Lowe collection in the San Diego Museum contains numerous specimens from the type locality, Galapagos but none from elsewhere. Sets are from Seymour Bay, Indefatigable Island, Galapagos; Albemarle Island, Galapagos.

Nassarius noduliferus (Philippi),1848. Listed by Dr. Dall from " San Diego *to Gulf of. California* ". However, this is another species that we propose to drop from our faunal list. Mr. A.M. Strong states the problem or perhaps but one of them as follows: " *Nassarius nodifera* Powys- C.B. Adams and Carpenter recognize this as a west *coast shell*, Panama and Galapagos. The name seems to have been mixed with *N. noduliferus* Philippi which seems definitely to have come from the China *seas, though* Carpenter used it for a variety of *N. tegulus* and states non *nodifera* Powys. Tomlin has something to say about *this in* Proc. Mal. Soc. vol.20, p.43. It is doubtful is either name can be applied to a west coast shell and certainly not from San Diego."

The only collecting records we have are two from Mazatlan,Mexico (Lowe and also A. Forrer).

Nassarius insculptus (Carpenter),1864. Point Arena, California to Cerros *Island, Lower Calif.* Type locality, Catalina Island, Calif. in 30-40 fms.- " ... characterized by fine spiral sculpture and by the absence of axial sculpture except on the small, upper whorls of the spire. The inner lip has a definitely delimited parietal callus. The form *eupleura* is an individual variation of no taxonomic value." (Grant and Gale, p.677). The consensus of opinion is to follow Grant and Gale and abandon *N. insculptus eupleura* Dall,1916 to the synonymy of the typical.

Collecting data: Our experience has been to find this a rather common form in relatively deep water. Our records show off Redondo Beach 25 to 75 fathoms, off El Segundo in 50 fms., off Santa Cruz Island in 50 fms., off Avalon, Catalina Island in 35 fms. (Burch); down to at least 200 fms. off Catalina (G. Willett); San Pedro, Calif. in 20 fms. (G. Willett); Newport Bay (Lowe); Catalina Island in 30 fms. (Lowe); off south end of San Clemente Island in 50 fms. (Dr. Fred Baker); Magdalena Bay, L.C. (Porter).

Subgenus Schizopyga Conrad,1856. Type (by monotypy), Schizopyga californiana Conrad.

" Shell rather thin, bucciniform, with a conspicuous constriction on the base of the body whorl; sculpture cancellate or with spiral threads and broad axial folds; outer lip simple, lirate within, the posterior notch not developed; parietal wall concave, with or without a callus wash."

The status of Schizopyga is obviously affected by that of the genotype. This is very uncertain.

Nassarius californianus (Conrad),1856. Squaw Creek, Oregon (A.M. Keen) to Magdalena Bay, Lower Calif. (Eric Jordan). Type locality, Santa Clara, Calif (Santa Clara County); presumed to be Miocene (Grant & Gale). Dr. W.P. Woodring (Per. Comm. July,1945) comments on the species as follows: " Nassa" californiana. The type based on fossil material, presumably Pliocene, from a locality near Santa Clara, is lost and the status of this species is uncertain. It is probably the species described later as " Nassa" moraniana. " Nassa" moraniana is an extinct Pliocene species not known to occur in the Pleistocene, though "N" grammata, alleged to be from Santa Barbara, presumably Pleistocene, is a synonym. The Recent species, identified by Dall as californiana is not moraniana and evidently is not californiana. It presumably needs a new name." Dr. A.M. Keen comments upon the above " His point about californiana is well taken which leaves Schizopyga rather more shaky than one would wish. " Perhaps Dr. Woodring will give us a new name for it. Before leaving the subject though the following is of some interest. Grant and Gale ,1931, p.676 under Nassarius moranianus (Martin) 1914 state that it is known in Recent collections as gouldii. Dr. A. Myra Keen advises regarding the name gouldii as follows: " The name Nassa gouldii is, so far as I am aware, a nomen nudum. In about 1917 Stanley Herold and Mrs. Oldroyd revised the fossil and Recent nassarids in the Stanford West Coast Collection and planned a paper in which a number of new species were to be described, one of which was N. gouldii. The paper was never published. All of their specimens labelled " N. gouldii" are fossils, so that I am at a loss to explain the statement by Grant and Gale." Mr. George Willett comments " Don't know what this means. I have found moranianus only in Pliocene."

Collecting data: Newport Bay, Calif. (Chace); living specimens from Drakes Bay, Calif. and Monterey Bay, Calif. in 15 fms. (H.N. Lowe); Lower Calif., no locality given, by Geo. D. Porter who collected for Miss J.M. Cook. this was one of the characteristic species of the Del Rey Pleistocene deposit in the Baldwin Hills, Calif. (Burch).

Nassarius fossatus (Gould),1849. Vancouver Island, British Columbia to San Ignacio Lagoon, Lower Calif. (Eric Jordan). Type locality, " Puget Sound and Mouth of Columbia River" (Gould).

Collecting data: This is our common large species of this genus. An interesting feature of their habit is that one of the bestways to collect a number of them is to stake out a dead fish or piece of decaying meat in the water and in a short time these will start to move toward the bait. Their sense of smell, or whatever it is, is interesting because they may be observed heading toward this bait as far away as 50 ft. or more. Our experience has been to find them very abundant in Morro Bay 6/36, Anaheim Bay 1/19/36, Newport Bay 6/36, Seaside,Oregon 2/41, Terminal Island,San Pedro and the

Estero below Ensenada,Mex. They are apparently not seasonal but we recorded them as spawning in Anaheim Bay in January. The bathymetric range is not deep but we have taken them as deep as 20 fathoms off Redondo Beach (Burch). Cape Perpetua,Oregon to San Diego, Calif. (San Diego Museum);

Nassarius mendicus (Gould),1849. Kodiak Island, Alaska to Magdalena Bay, Lower California. Type locality; Dr. A.M. Keen advises that " The holotype label of N. mendicus at the National Museum gives the type locality as Straits of Fuca".

" N. mendicus (Gould) has a narrow spire, with fine spiral sculpture and axial plications. It grades into variety cooperi, a variety with few, broad undulous axial ribs. N. mendicus differs from perpinguis in its fewer more continuous axial ribs." (Grant and Gale, p.674).

The variety indisputabilis I.S. Oldroyd,1927, was figured by Mrs. Oldroyd but not described. It is generally ignored as of no value.

Collecting data: Our experience has been to find the typical of this species the predominant form in the northern part of the range with cooperi more common in the south. The specimens in our collection from Port Orchard, Washington show less indication of the axial ribbing than any of the others in our collection. Not uncommon in dredgings off Monterey in 10,25 and 40 fathoms, but more common under 25 fms. but the predominant Monterey form seems to be cooperi. Fairly typical specimens taken littoral in Morro Bay. (Burch); Kodiak Island; Prince William Sound (Lewis) (G. Willett); Bear Bay, Peril Straits,Alaska (Kate Stephens) and on down the coast to San Diego (San Diego Museum).

Nassarius mendicus cooperi (Forbes),1850. Puget Sound to San Doego,Calif. (Dall). Type locality, Sandwich Islands, possibly a ballast shell (fide Grant and Gale).

This variety is characterized by fewer and larger axial ribs than typical mendicus, but all stages of intergrades may be selected. If it were not for that fact that one seems to be northern and the other southern in the center of their respective ranges it would be suggested that this variety be placed in the synonymy of the typical.

Collecting data: This common species may be taken in every lagoon as well as all along the open coast. It is one of the most common shells in the dredgings down below 25 fathoms off Redondo Beach, Calif. as well as Monterey, Dana Point,on down to Todos Santos Bay, Mexico. Just note that the last seems to be an extension of range from the above for cooperi. (Burch Cayucos, Calif. (Wilcox); Newport Bay (Lowe); Mission Bay (Bristol); San Diego (Hemphill); off South Coronado Island in 10 fms. (Dr. Fred Baker).

Dr. W.P. Woodring calls attention to an interesting fact about the specie Nassa intastriata Conrad,1855 " Nassa" interstriata (or intastriata) Conrad, 1855. Based on fossil material from San Pedro. The type is lost. Carpenter thought it is "N" mendica." Grantand Gale, however, place this species in the synonymy of perpinguis.

Nassarius cerritensis (Arnold),1903. Long Beach, Calif. to Magdalena Bay, L.C. (Dall). Dr. A. Myra Keen advises " Specimens of Nassarius cerritensis in the Stanford collection collected by H. Hemphill at Point Abreojos, L.C. were identified as such by Dr. Dall. Type locality, Los Cerritos (Signal Hill Los Angeles County, Pleistocene.

This is another very questionable member of our Recent fauna. It is a common fossil in local Pleistocene deposits but seems to be of the southern fauna. The consensus of opinion regarding this species is stated by Mr . George Willett briefly " Probably Lower Californian".

Collecting data: N. cerritensis (Arnold) - Characterized by being more elongate than fossatus with fewer axial ribs. It is not uncommon in the Del Rey deposit of the Baldwin Hills Pleistocene. (Burch); living specimens from Santa Maria Bay, Lower Calif. (Lowe); 2 specimens living from San Ignacio Lagoon, L.C. (Lowe).

Dr. W.P. Woodring advises (Per. Comm. July,1945) " Nassa" cerritensis A small race or a closely related species is living along the Lower California coast at Point Abreojos and Ballenas Bay and in the Gulf of Calif. at Guaymas."

Nassarius perpinguis (Hinds), 1844. Puget Sound to Magdalena Bay, Lower Calif. (Grant and Gale.) Type locality, Magdalena Bay, Lower California.

This very common ventricose species needs no discussion. N. perpinguis bifasciata Berry, Nautilus, vol.22, p.39,1908 is a color variety and generally ignored as of no consequence.

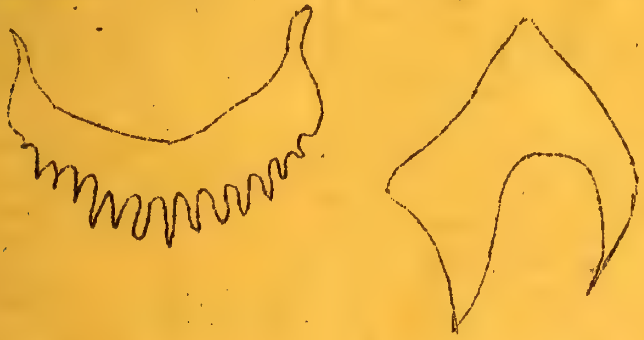
Collecting data: Very abundant in all sloughs as well as along the open coast. A list of collecting localities would be a waste of paper listing every point on the coast. It might be mentioned that the bathymetric range is of some interest. We have brought it up living from close to 50 fathoms off Redondo Beach and as deep as 40 fathoms off Monterey, 35 fms. off El Segundo (Burch)

Subgenus Ilyanassa Stimpson,1865. Type (by original designation) N. obsoleta Say.

Nassarius obsoletus (Say),1822. San Francisco Bay (introduced).

Collecting data: Very abundant on the mud flats along the Bay Shore Highway just north of San Mateo, Calif. in May,1939 (Burch).

Below is a drawing of the radula of Nassarius fossatus (Gould)- Rachiglossa.



The following genera are not represented in our fauna north of San Diego but a list of the species in the southern fauna discussed in Mr. A.M. Strongs notebook may be of interest.

Genus Phos Montfort,1810.

Phos articulatus Hinds,1844. Central America.
Phos gaudens Hinds,1843 Montijo Bay (Lowe) Acapulco,Mex. Punta Penasco(Lowe
Phos varaguensis Hinds,1843. Acapulco, West Mexico.
Phos crassus Hinds,1843
Phos cocosensis Dall,1896.
Phos minusculus Dall,1917.

(con.)

Phos chelonia Dall,1917.
Phos fusoides C.B. Adams,1852.
Phos clarki Smith,1944. Panama Bay.

Genus Nassarina Dall,1889 in Collumbellidae.
Nassarina solida Dall,1917. La Paz
Nassarina atella Pilsbry & Lowe,1932. Acapulco.
Nassarina xeno Pilsbry & Lowe,1932 Nicaragua
Nassarina poecila Pilsbry & Lowe,1932. Nicaragua
Nassarina pammicra Pilsbry & Lowe,1932. Nicaragua

Genus Hindsia Adams,1853.
Hindsia periderie Dall,1910. La Paz.
Hindsia acapulcana Pilsbry & Lowe,1932. Acapulco. nr. Manzanillo,Mex.
Hindsia ariel Pilsbry & Lowe,1932. Nicaragua

Genus Northia Gray,1847.
Northia northiae (Gray),1833. Gulf of California to Ecuador.

Genus Buccinanops
Buccinanops squalides King,1831. Peru.

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Family COLUMBELLIDAE

Some of our members have been disposed to follow Grant and Gale in the use of the family name Pyrenidae. This usage was based largely upon their assumption that all family names should be based upon the oldest genus in the group. In regard to this name Dr. A. Myra Keen advises (Per. Comm.) " I believe that Pyrene and Columbella are at least subgenerically separable. Hence, the family name Columbellidae is available by priority. ". Mr. A.M. Strong also states " From the types Pyrene seems to be quite distinct from Columbella of the north Atlantic. I think we should use the family name Columbellidae, but not the genus Columbella."

Key to Genera of the family Columbellidae- Mr. A.M. Strong.

Shell coniform,aperture long and narrow .... Paramentaria
Shell strombiform to ovate
. With both posterior and anterior canal
.. Shell with both axial and spiral sculpture........ Microcitharia
.. Sculptured with spiral striae on the canal only .... Bifurcium
. With anterior canal only
.. With spiral sculpture only
... Spire short, shell thick and heavy .... Pyrene
... Spire as long or longer than aperture,shell smaller .. Mitrella
.. With axial and spiral sculpture
... Shell 8 mm. or more in length .... Anachis
... Shell less than 8 mm. in length .... Seminella
Shell subcylindric, columella and canal short .... Aesopus
Shell tapering, body whorl swollen .... Strombina
Shell bucciniform, lip sharp or only slightly thickened
. With reticulated sculpture .... Amphissa
. With fine spiral sculpture only .... Cosmioconcha

Genus Paramentaria Dall,1916. No species reported north of San Diego.
Paramentaria dupontii (Kiener) Gulf of California Tryon,v.5,pl.60
Paramentaria coniformis (Sowerby) Gulf of Calif.
Paramontaria concinnata (Crosse),1858. Central America

Genus Microcitharia Fischer,1884.
Shell yellowish white, with irregular chestnut marks
15 mm Panama........................ harpaeformis
Shell fulvous olive, freckled with pale dots
11 mm. Acapulco to Central America .... uncinata
Tryon, vol.5, p.196
Microcitharia harpaeformis (Sowerby),1832. Panama
Microcitharia uncinata (Sowerby),1832. Acapulco to Central America

Genus Bifurcium Fischer,1884.
Shell pale livid, with longitudinal lines Panama and Galapagos-Bifurcium
Tryon vol.5, p. 183.
Bifurcium bifurcium Fischer Panama
Montijo Bay (Lowe)

Genus Pyrene Roding,1798. No species reported north of San Diego.
Type (by monotypy), Pyrene rhombiferum Roding,1798 -- Buccinum punctatum Bruguiere - Voluta discors Gmelin.
The following key to species of Pyreneis from Mr. A.M. Strong's notebook

Whorls channeled between the shoulder and suture
. Shell chocolate brown with fine white dots
28 mm Panama to Peru .... paytensis
Tryon, vol.5, p.104
. Shell chestnut brown with white spots, orange within
21 mm Central America to Galapagos .... castanea
Tryon, vol.5, p. 105
Body whorl swollen at the shoulder, not channeled
. Shell chestnut with large white blotches
35 mm. Gulf of California to Peru .... strombiformis
Tryon, vol.5, p.104
. Shell brownish with small white spots
32 x 21 mm. Gulf of California to Peru .... major
Tryon, vol.5, pl.42, fig,6-79
. Shell chestnut with broad white markings, orange within
25 mm. Gulf of California to Panama .... haemastoma
Tryon, vol.5, p.106
Body whorl regularly rounded
. Brown with irregular white markings
22 mm. Cape San Lucas to Galapagos .... fuscata
Tryon, vol.5, p.105
. Ash colored with narrow chestnut spiral lines
25 mm. West Columbia .... labiosa
Tryon, vol.5, p. 106
. Longitudinally streaked with white and chestnut
9 mm. Cape San Lucas to Panama .... lucasana (festiva)
Tryon, vol.5, p. 106

Pyrene strombiformis (Lamarck),1822. Gulf of California to Peru
Pyrene major (Sowerby),1832. Gulf of California to Peru
Pyrene haemastoma (Sowerby),1832. Gulf of Calif. to Panama
(con.)

Pyrene fuscata (Sowerby),1832. Gulf of Calif. to Panama
Angeles Bay, Gulf of Calif. Santa Elena,Ecuador. Hood id.,Galapagos.
Pyrene lucasana (Dall) Cape San Lucas to Panama
San Juan del Sur (Lowe)
Pyrene castanea (Sowerby),1832. Central America to Galapagos
Pyrene labiosa (Sowerby),1832 Central America to Ecuador
Pyrene paytensis (Lesson),1832. Panama to Chile

Genus Mitrella Risso,1826. Type (by subsequent designation, Cox, 1927), M. flaminea Risso = Murex scriptus Linnaeus.

Grant and Gale,1931, p.p. 689-692 give an excellent discussion of this genus and the species involved.

" Shell of medium weight, rather high spired, acutely conical; whorls almost flat to moderately ventricose, sutures linear slightly impressed; spiral sculpture confined to basal portion of body whorl (typically) or uniform over entire shell; aperture small, elongate ovate, one-half or less the length of the shell; outer lip sometimes thickened and denticulate or lirate within; inner lip with or without lirations or denticulations on columella, which is short or obliquely truncated; anterior canal hardly or not at all differentiated from the basal portion of the aperture; posterior canal undeveloped or represented by a slight flare or shallow channel on the outer lip at junction with body whorl. Size generally small."

The following key and list of species is from Mr. A.M. Strong's note-book. We will then take up a detailed discussion of the species reported from San Diego northward.

Genus Mitrella

Spiral sculpture extending over the last three whorls
9.4 x 3.4 mm. Gulf of California .... granti
Proc. San Diego Soc. Nat. Hist. vol.8, p.20.
Spiral sculpture confined to the base and canal
. Body whorl with a sharp carina at the shoulder
10 x 5 mm. San Francisco to Cape San Lucas .... carinata
Oldroyd, vol.2, part 1, p. 272
. Body whorl without carina
.. Shell stout, the spire about equalling the aperture in length
... Variously marked with varying shades of brown
10 x 5 mm Forrester Island to Mexico .... californiana
... Pale brown, irregularly spotted with yellowish white
8 x 3.75 mm. Alaska to San Diego .... gouldii
Oldroyd, vol.2, part 1, p.277
... Bluish white, epidermis yellowish
14 x 7 mm. Alaska to San Diego .... permodesta
Oldroyd, vol.2, part 1, p.275
... Pale, sometimes with pale brown variations
7 x 3.5 mm. Fuca Straits to Coronado Islands ..... luculenta
Oldroyd, vol.2, part 1, p.277
... White, more or less clouded with chestnut
8 mm. Cape San Lucas to Gyacomyo .... santabarbarensis
Tryon, vol.5, page 118
... Minutely punctate with orange spots arranged in quineunx
7.5 mm. Cape San Lucas to Panama .... millepunctata
Tryon, vol. 5, p.198
... Brownish with chestnut dots arranged in protractive rows
5.5. x 2.3 mm. Gulf of California .... lalage
Proc. Phila. Ac. Sci. vol.84, p.70

... Livid, with divaricating orange brown lines
6.25 mm. Cape San Lucas .... densilineata
Tryon, vol. 5, page 115
... White, with 1 to 3 bands of chestnut tessellations
6 mm. Gulf of Calif. to Panama .... baccata (cervanella)
Tryon, vol. 5, p. 114
... Uniformly chestnut brown
Gulf of California .... dorma B. H. & S.
... White, with a central band of brown blotches
3.4 x 1.8 mm. Acapulco to Panama .... hartfordi S. & H.
... Yellowish, with white dots on the spire
7 mm. Panama .... elegans
Tryon, vol.5, p. 115
... Transparent white with a spiral row of milk white dots
7 mm. Galapagos .... rorida
Tryon, vol.5, p.147
... Reddish fulvous, white next the suture
13 mm. Guayquil .... electroides
Tryon, vol. 5; p. 117
... Chocolate with a lighter band on the periphery
12 mm. Chile and Peru .... unifasciata
Tryon, vol.5, p.116
... Uniformly chocolate or chestnut
12 mm. Peru and Chile .... unicolor
Tryon, vol. 5, pl.47, fig. 41.
.. Shell slender, conic, spire longer than the aperture
... Periphery of the body whorl angulated
.... Shell pale, unicolor
8 x 3.5 mm. Alaska to Gulf of Calif. .... tuberosa
Oldroyd, vol.2, part 1, p.271
.... Shell yellowish
9 x 4 mm. San Diego .... casciana
Oldroyd, vol.2, part 1, p. 274
... Periphery of the body whorl rounded
.... Adult shell more than 15 mm. in length
..... Waxen white with reddish paintings
18 x 6 mm. Cape San Lucas .... xenia
Proc. USNM, vol. 56, p. 330
..... Yellowish white with narrow chestnut lines
24.5 x 10 mm. Gulf of Calif. .... nasuta
Tryon, vol.5, p. 136
..... White, variegated with brown flashes
19 mm. ? Gulf of Calif. .... acicula
Tryon, vol.5, p. 119
.... Adult shell less than 10 mm. in length
..... Light rufus or yellowish, with faint markings
7.5 mm. Puget Sound to Mexico .... hypodra
Oldroyd, vol. 2, part 1, p. 275
..... Yellowish with brown markings
5 x 2.5 mm. San Diego to Magdalena Bay .... callimorpha
Oldroyd, vol.2, part 1, p. 274
..... Orange yellow, with zig-zag lines
4.5 x 1.2 mm. Monterey to Magdalena Bay .... aurantica
Oldroyd, vol.2, part 1, p. 276
..... Yellowish horn with zig-zag brown lines
3.2 x 1.5 mm. San Clemente and Catalina Islands ... clementensis
Proc. USNM, vol. 70, p.2

.. Shell oblong-pyramidal, apex truncate in the adult
... Reticulated with chestnut or chocolate and white
17.5 x 6 mm. Gulf of Calif. to Peru .... ocellata
Tryon, vol.5, p. 122
... Shell paler, more slender, with flatter whorls
Gulf of Calif. to Panama .... delicata
Reeve, pl. 27, fig. 171.

Genus Mitrella Risso,1826.

Mitrella carinata(Hinds)1844. Forrester Island to Salina Cruz
var. californiana (Gaskoin),1852
var. gausapata (Gould),1850.
Mitrella gouldii (Carpenter),1857. Alaska to San Diego
Mitrella permodesta (Dall),1890. Alaska to San Diego
Mitrella tuberosa (Carpenter),1865. Puget Sound to Mexico
Mitrella hypodra (Dall), 1916. Puget Sound to Mexico
Mitrella lutulenta (Dall),1919. Fuca Straits to Coronado Islands
Mitrella aurantiaca (Dall),1871. Monterey to Magdalena Bay.
Mitrella clementensis (Bartsch),1927. Catalina Island & San Clemente Id.
Mitrella casciana (Dall),1919. San Diego.
Mitrella callimorpha (Dall),1919. San Diego to Magdalena Bay.
Mitrella ocellata (Gmelin),1791. Gulf of Calif. to Peru. Atlantic.
var. baileyi Bartsch & Rehder,1939 Galapagos
Mitrella delicata (Reeve),1858. Gulf of Calif. to Panama.
Mitrella santabarbarensis (Carpenter),1856. Gulf of Calif. to Central Amer.
Mitrella millepunctata (Carpenter),1864. Gulf of Calif. to Panama
Mitrella baccata (Gaskoin) Gulf of Calif. to Panama.
Mitrella densilineata (Carpenter),1864. Cape San Lucas
Mitrella nasuta (Menke),1850. Gulf of California
Mitrella xenia (Dall),1919. Cape San Lucas
Mitrella acicula (Reeve),1858. Gulf of California
Mitrella lalage Pilsbry & Lowe,1932. Gulf of California
Mitrella granti Lowe, 1935. Gulf of California.
Mitrella dorma B. H. & S. Gulf of California
Mitrella hartfordi Strong and Hertlein,1937. Mexico to Panama.
Mitrella unicolor (Sowerby),1832. Panama to Peru.
Mitrella elegans (Dall) Panama
Mitrella pulchrior (C.B. Adams), 1852. Panama
Mitrella rorida (Reeve),1858. Galapagos
Mitrella electroides (Reeve),1858. Galapagos
Mitrella unifasciata (Sowerby),1832. Chile

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Mitrella carinata (Hinds),1844. Forrester Island, Alaska to Salina Cruz
Type locality, Bodegas and San Diego.

The varities hindsii Reeve,1858 and californiana Gaskoin, and gausapata Gould,1850 are all but forms of carinata and intergrade so clearly that it is the consensus of opinion that they are but one species. This is indicated by Grand Gale. The only distinctions between these is the amount of devel--opment of the keel. Of course, it is possible to select from a large series a nice set of any of them particularly gausapata. However, it seems expedient to retain gausapata as a subspecies of carinata because of the possibility that it is a good geographic race. Mr. George Willett states about this " None of my specimens from Prince of Wales Island, Alaska (shore) show any indication of a keel. Unless carinated specimens are found from the north, it may be advisable to recognize gausapata as the northern race which inter--grades with carinata as it comes down the coast, much as Nassarius mendicus and N. cooperi."

Collecting data: Our experience has been to find this small species exceedingly abundant all the way from Monterey, Calif. to Todos Santos Bay, Mex. It is usually associated with algae and rocky shores although not uncommon in bays on eel grass etc. One of the favorite habitats is the large floating kelp, Macrocysta. It is common in the dredgings off Monterey down to 10 fathoms or more, Redondo Beach down to perhaps 25 fathoms, Catalina Island as deep as 35 fathoms, Ensenada, Mexico in 15 fathoms. However, I have never been certain whether these deeper specimens really lived in such bottom algae as the fine lacy Acrosorium or were simply washed off of the heavier floating algae. It is abundant among therocks in littoral collecting but I think always where there is kelp off shore. (Burch);

Mitrella carinata gausapata (Gould),1850. Discussed above. Same range as the typical. Type locality, Puget Sound.

Mitrella callimorpha (Dall),1919. San Diego, Calif. to Magdalena Bay,Mex. Type locality, San Diego, Calif.

We list this species but there is great doubt if it is really distinct. No member of the club uses this name to label a specimen. Following the description which is reproduced in Oldroyd, Dr. Dall makes the following comment " This belongs to the group of A. californiana, from which it differs by its much smaller size, relatively more slender form, and less pronounced coloration." Having placed californiana in the synonymy of carinata it is difficult to immagine this shell being greatly different. However, no one seems to have compared the type and we will list it until we know more about it.

Mitrella casciana (Dall),1919. U.S. Fish Commission station 4322, off La Jolla, San Diego County, Calif., in 110 to 199 fathoms, shelly mud. (Dall).

So far as we know this species has never been reported other than the original type lot. It has never been figured, and one perhaps significant statement by Dr. Dall following the description is " All those obtained at this station were " dead" shells".

Subgenus Astyris H. & A. Adams, 1853. Grant and Gale, 1931, p. 691 discuss this matter at length and figure the genotype " Mitrella rosacea (Gould). Dr. Dall used this as a subgenus of Columbella, but it has been rather extensively used with generic standing. Dr. Bartsch in 1927 described Astyris clementensis. However, Grant and Gale make an excellent case for their statement " ... and the differences do not appear to warrant generic or subgeneric separation." We are disposed to agree with this and attempt no subgeneric divisions.

Mitrella clementensis (Bartsch),1927. Proc. U.S.N.M. vol.70,Art.11, p.2, 1927. San Clemente and Catalina Island. Type locality, " on rocks at San Clemente Island."

Mr. A.M. Strong states " I have two specimens collected on the rocks near Avalon, Catalina Island. It seems to be quite distinct." Dr. Bartsch following the description comments " This species is nearest related to Astyris aurantiaca Dall, but is uniformly smaller."

Inasmuch as the original description of this species is not in Oldroyd we reprint it for convenience of members.

" Shell very small,elongate-ovate. Nuclear whorls flesh colored. Post-nuclear turns yellowish horn colored with various zigzag markings and fulgurations of brown. Nuclear whorls smooth. Postnuclear whorls appressed at the summit,marked by very fine lines of growth which are almost vertical, and numerous, closely spaced, microscopic spiral striations. Suture very slightly constricted. Periphery of the last whorl well rounded . Base long, moderately rounded ; columella marked by eight feebly developed spiral cords. Aperture large; posterior angle acute,decidedly channeled anteriorly; outer lip thin showing the external markings within; inner lip sinuous; parietal wall covered with a thin callus".

Mitrella aurantiaca (Dall),1871. Monterey, Calif. to San Martin Island, L.C. (Baker). Type locality, Monterey, Calif.

Collecting data: This seems to be a good species. Our experience has been to take it littoral at Monterey in the rocky rubble and pick it up in the dredgings on the shale off Del Monte down to perhaps 20 fathoms. We have found it comparatively rare in southern California but have found a few occasional specimens at Dana Point, Orange County. (Burch); Monterey (Lowe); Catalina Island (Hemphill); No. Island, Los Coronados (Frank Stephens);

Mitrella tuberosa (Carpenter),1865. Forrester Island, Alaska to Gulf of California. Type locality, Santa Barbara, Calif.

Collecting data: Our experience has been to find this species in somewhat deeper water than the more common carinata. Dredged off Monterey in 10 fathoms, Redondo Beach in 25 fathoms, Avalon, Catalina Island in 25 fms., El Segundo in 35 fms., Santa Monica in 10 fms., and in Todos Santos Bay, Mexico in 20 fathoms (Burch); San Martin Island, L.C. in 30 fms. (Fred Baker); San Diego (Hemphill); San Diego (Baker); So. Id., Los Coronados in 7-10 fms. (Fred Baker); Catalina Island in 20 fms. (Lowe).

Mitrella rosacea (Gould),1840. Icy Cape, Arctic Ocean, south to Peril Straits, Alaska. Circumboreal. Johnson gives the Atlantic range" Labrador to New Jersey, 3 to 60 fathoms". Type locality, off Cohasset, Massachusetts.

This species is the type of Astyris H. & A. Adams and is figured and discussed by Grant and Gale.

Mitrella amiantis (Dall),1919. Kyska Harbor, Aleutian Islands, Alaska.

Mitrella permodesta (Dall),1890. Unalaska, Aleutian Islands, south to San Diego, Calif. in deep water. (Dall). Oldroyd gave the type locality in error as near the Galapagos Islands. Dr. A. Myra Keen advises " Mrs. Oldroyd miscopied the type locality of Mitrella permodesta. It should be Station 2840, off Santa Barbara Islands, California, 276 fathoms."

Mitrella hypodra (Dall),1916. Puget Sound to Puerto Libertad,West Mexico. (Dall). Type locality, San Diego, Calif.

Mr. A.M. Strong comments on this as follows: " I have specimens identified by Dall from the giant kelp off Catalina. I think it is a good species." This was in answer to a question made by John Q. Burch in the preliminary discussion. We have collected a small thin species, in our experience on off shore floating kelp which we have had identified as hypodra. We collected large numbers of these from the kelp about 3 miles off Ensenada in Todos Santos Bay. While it is true that they fit the description, and the species seems to be well figured in Oldroyd, the natural question is whether they are the young of carinata in the first place. And if not perhaps they may be a form of carinata caused by the habitat and would have been normal carinata had they originated on shore. All records we have of hypodra are from this off shore kelp. However, the consensus of opinion seems to be that it is a good subspecies if not a good species.

Dr. Dall placed the following two species in the genus *Nitidella* Swainson,1840. The majority opinion on this matter is well stated by Mr. A.M. Strong " Mitrella gouldii (Carpenter)- Carpenter placed this in *Nitidella,* an east coast genus with plaits on the columella. Dall also used this name for west coast shells but said that in them the plaits were obsolete. Our shells certainly show no sign of plaits." Grant and Gale,1931, p.695 also state " The margin of the oblique truncation on the lower part of the columella of *gouldii* has a small, low ridge or marginal plait which is unlike the plication on the columella of typical *Nitidella nitida* (Lam.), and *gouldii* is probably not genetically related to *Nitidella.* The shape of the entire shell and particularly the oval aperture require its being placed *with Mitrella.*"

Mitrella gouldii (Carpenter),1857. Kodiak, Alaska to Manuel's Lagoon, L.C. (Jordan). Type locality, Santa Barbara, Calif.

Collecting data: The body whorl of this species is more ventricose and it is unmistakable. Our experience has been to find it a deep water species bringing it up in considerable numbers but from below 50 fathoms off Redondo Beach, our deepest record being 80 fathoms. (Burch); Craig and Forrester Island, Alaska in 15 to 30 fathoms (G. Willett); Kodiak Island in 15 fms.; Prince William Sound (Lewis) (Willett); near Orcas Island, Puget Sound in 10-30 fms. (Fred Baker); Victoria, B.C. (Lowe).

Mitrella lutulenta (Dall), 1919. Fuca Strait to Coronado Islands. Type locality, Gulf of the Farallones, off San Francisco,Calif. in 24 fms.

Dr. Dall in Bulletin 112 was followed by Mrs. Oldroyd and others in spelling this species *luculenta.* However, the original description in Proc. USNM vol.56,p.331 spelled it *lutulenta.*

Additions and Corrections

Mitrella hypodra (Dall),1916 - add to locality records on previous page- No. Id., Los Coronados, Mex. (Frank Stephens); So. Id. , Los Coronados, Mex. in 4 fathoms (Fred Baker); Isthmus Cove, Catalina on kelp (Strong); San Benito Island, Lower Calif. in 10 fms. (H. N. Lowe).

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Genus *Anachis* H. & A. Adams,1853. Type (by subsequent designation, Tate,1875), *Columbella scalarina* Sowerby.

" Shell like that of *Pyrene* but with axial ribs and in many cases smaller".

The following key to species and list from Mr. A.M. Strong's notebook covers the entire coast. We will then take up a more detailed discussion of the species recorded north of San Diego.

Shell more than one half inch in length
. Spiral sculpture faint or wanting on the spire
.. Axial ribs nodulous at the shoulder or suture.
... Axial ribs short, not continuous over the whorls
.... Axial ribs straight
Yellowish white with zigzag dark lines
13 x 6 mm. Cerros Island to Panama .... *coronata*
.... Axial ribs curved on the body whorl
White with close longitudinal chocolate markings
21 x mm Panama to Peru .... *fluctuata*
... Axial ribs continuous to the periphery
.... Axial ribs narrow, sharp
Yellowish white, two spiral bands of chestnut spots
18 x 6 mm Lower Calif. to Panama .... *lyrata*

.... Axial ribs narrow, sharp
Yellowish brown, closely reticulated with chestnut
16 x 7 mm. Gulf of California to Chile............ varicosa
.... Axial ribs flattened in the middle
Purple brown, spotted or banded with white
16 x 8 mm. Mazatlan .... pachydermata
.. Axial ribs not nodulous at the shoulder
... Axial ribs fine, close spaced
Variously marbled, with an ill-defined central white band
25 x mm. Gulf of California to Panama .... varia
... Axial ribs strong, wide spaced
.... Spiral sculpture confined to the canal
Pale brown or white
15 x 6 mm. Galapagos .... fusidens
.... Spiral sculpture on both base and canal
..... Axial ribs on the body whorl 11, on the spire 20
Blackish with a peripheral band of white blotches
13.5 x 5.5 mm. Gulf of California .... sanfelipensis
..... Axial ribs about 13 on all whorls
Flesh colored with blotches of brown between the ribs
17 x 6.5 mm. Nicaragua .... decimdentata
. Spiral sculpture distinct on all whorls
.. Axial ribs nodulous at the shoulder or suture
... Axial ribs confined to the upper half of the body whorl
Whitish, chocolate clouding on the back of the body whorl
18 x mm. Gulf of Calif. to Peru .... rugosa
... Axial ribs continuous to the periphery
.... Whorls strongly swollen below the suture
Nearly black with a white peripheral band
13.5 x 6.5 mm. Panama .... gilva
.... Whorls shouldered, somewhat inflated
Brown with a white band below the suture
22 x 10 mm. Gulf of California to Panama .... scalarina
.. Axial ribs not nodulous at the shoulder
...?
Yellowish white, two spiral rows of brown spots nodulous
20 x mm. Gulf of California to Peru .... lentiginosa
...?
Covered with irregular chocolate markings
13 x mm. Panama to Peru .... rugulosa
...?
Blackish brown, ribs yellowish
15 x mm. Central America .... pardalis
Shell from one fourth to one half inch in length
. Spiral sculpture faint or wanting on the spire
.. Axial ribs nodulous at the shoulder or suture
... Ribs becoming obsolete on the body whorl
White with longitudinal chestnut streaks or spots
10 x mm. Peru .... suffusa
... Ribs becoming obsolete toward the middle of the whorls
White and chestnut in alternating interrupted bands
10 x mm. Galapagos .... varians
.. Axial ribs not nodulous at the shoulder
... Spiral sculpture confined to the canal
.... Axial ribs 11-12, rather broad, rounded
White, narrow brown spiral lines and peripheral spots
8 x 3.5 mm. Gulf of California .... bartschi

.... Axial ribs about 14, narrow, sharp
White
9 x 3.5 mm. Salina Cruz .... phanea
... Spiral sculpture on both base and canal
....?
Mottled reddish brown, a peripheral row of white spots
7.5 x 3 mm. Panama .... gracilis
....?
Blackish with waved yellowish axial lines
10 x 5 mm. Gulf of California .... nigrofusca
. Spiral sculpture distinct on all whorls
.. Axial ribs nodulous at the shoulder or suture
...?
Dark chocolate with a white sutural band
9 x mm. Gulf of California .... spadicea
...?
White, punctate with black
11 x 6 mm. Panama .... nigropunctata
.. Axial ribs not nodulous at the shoulder
... Spiral sculpture of raised cords
.... Axial ribs about 16
Flesh colored, blotched and streaked with brown
7.7 x 3.4 mm. Ecuador .... whitei
.... Axial ribs about 20
Marbled with black , yellow and white nodulous
8.3 x 3.9 mm. Nicaragua .... hilli
.... Axial ribs indistinct, undulated
Brownish, maculated with purple
7 x 3 mm. Mazatlan .... serrata
... Spiral sculpture of incised lines
.... Axial ribs extending to the canal
Nearly black with 10 lighter colored ribs
9 x 3.5 mm. Nicaragua to Panama .... carmen
.... Axial ribs fading out at the base
..... Axial ribs 7 ot 8
White with fuscous lines or maculations
6.5 x 3 mm. Acapulco .... humerosa
..... Axial ribs 10 to 20, distinct
...... All incised spiral lines cutting the ribs into nodules
Irregularly mottled with brown, orange and flesh color
7 x 3.3 mm. Panama .... tabogaensis
...... A single incised line cutting the posterior end of ribs
Black, sometimes with a light median band
8 x mm. Panama .... nigricans
...... Incised spiral lines confined to the interspaces
.... All sculpture obsolete on the back of the body whorl
Blackish, lighter on the back of the body whorl
7.5 x 2.75 mm. Panama .... moesta
.... ?
Dark chocolate, obscurely spotted with white nodules
10 x mm. Panama and Galapagos .... atramentaria
.... ?
Yellowish brown with a chestnut superior band
8 x mm. Central America .... milium
..... Axial ribs numerous, fine, principally on upper whorls
......?
With alternating white and brown spiral bands
6.2 x 2.75 mm. Gulf of Calif. to Galapagos .... incerta

......?
Pale, flamed and spotted with fulvous orange
12 x mm. Central America to Galapagos ...... elegantula
Shell less than one fourth inch in length
. Spiral sculpture faint or wanting on the spire
.. Axial ribs nodulous at the shoulder or suture
... Yellowish, fine lines and blotches of chestnut
6 x 3 mm. Gulf of California .... taeniata
.. Axial ribs not nodulous at the shoulder
... Axial ribs distinct, extending to the periphery
.... Axial ribs oblique
White, with three spiral rows of chestnut spots
6 x 3 mm. Gulf of California to Peru .... pygmaea
.... Axial ribs nearly vertical
..... ?
Uniformly reddish brown
23 mm. Gulf of Calif. to Panama .... fulva
..... ?
Whitish, base deep orange red
3.5 x 2 mm. Mazatlan .... rufotincta
.....?
White, with blood red spots
6 x mm. Central America .... cruentata
.... Axial ribs obsolete on the upper part of the whorls
White with two broad brownish orange bands
5 x 2.5 mm. Panama .... conspicua
.... Axial ribs indistinct
Greenish white with zigzag chestnut lines
3.25 x 1.5 mm. Mazatlan .... albonodosa
. Spiral sculpture distinct on all whorls
.. Axial ribs nodose at the shoulder or suture
... White, tinged with orange below the suture
5 x 2 mm. Cape San Lucas .... tincta
..Axial ribs not nodulous at the shoulder
... Incised spiral lines cutting the axial ribs
....?
Yellowish, with the base and canal chestnut
4 x 1.75 mm. Gulf of Calif. to Panama .... diminuta
.... Axial ribs about 12
Yellowish, marbled with chestnut
5 x 2 mm. Santa Barbara to Gulf of Calif. .... penicillata
.... Axial ribs about 16
Chestnut, darker on the posterior half of the base nodulous
6 x 3 mm. Ecuador .... strongi
.... Axial ribs about 20
Flesh color, anterior third of the base brown
5.3 x 2.8 mm. Ecuador .... reedi
... Incised spiral lines confined to the interspaces
.... Axial ribs distinct
..... Axial ribs about 15
Yellowish, a zone of chestnut spots above the periphery
6 x 3 mm. Panama .... dalli Bartsch
.....Axial ribs about 12 .... sinaloa S. & H.
.... guerroenis S. & H.

..... Axial ribs about 20
Purple brown, maculated with white
3.25 x 1.25 mm. San Pedro to San Diego .... subturrita
.... Axial ribs faint, subobsolete
Livid, shining, with a chestnut band
3.25 x 1.1 mm. Cape San Lucas .... fuscostrigata

Not placed in the Key

Columbella boivini Kiener - Coq. Viv. pl.11, fig.5; Famille des Purpuriferes, p.3, pl.11, fig.1. Sowerby, Thes. Conch., pl.38, p.126, fig.100. Reeve, Conch. Ic. pl. sp.43. Tryon, Man. Conch. vol.5, p. 112.

Tryon gives C. sowerbyi as a synonym.

Columbella vexillum Reeve. Conch. Ic. pl. fig.57. Given as of Sowerby by later authors. Carpenter, SMC, p.567 says no authority.

Columbella encaustica Reeve. Conch. Ic. pl. sp.56. Tryon, vol.5, p.164, questions the locality.

Anachis tilamen Dall. Find no reference to a description.

Anachis adelinae Tryon. Tryon, vol.5, p. Very doubtful if west coast.

Columbella pariolida Duclos. Tryon, vol.5, p.168, gives equals atramentaria.

Columbella deshayesi DeFolin. Fronds de la Mer., vol.1, pl.11, pl.1, fig.5. May be a form of A. pygmae.

Anachis nigricans Sby. Omitted from key.

List of Species of Anachis

Anachis coronata (Sowerby),1832. Cerros Island to Panama
Anachis rugosa (Sowerby),1832. Gulf of Calif. to Peru
Anachis lentiginosa(Hinds)1844 Gulf of Calif. to Peru
Anachis scalarina (Sowerby),1832. Gulf of Calif. to Panama
Anachis varicosa (Baskoin),1852 (costellata) Gulf of Calif. to Chile
Anachis lyrata (Sowerby),1832. (terpsichora) Gulf of Calif. to Peru
Anachis varia (Sowerby),1832. Gulf of Calif. to Panama
Anachis nigrofusca (Carpenter),1857. Gulf of California
Anachis spadica(Philippi)1846. Gulf of California
Anachis pachydermata (Carpenter), 1857. Gulf of California
Anachis gilva (Menke) Gulf of California to Central America.
Anachis vexillum (Reeve) Gulf of California
Anachis hilli Pilsbry & Lowe,1932. Gulf of California
Anachis sanfelipensis Lowe,1935. Gulf of California.
Anachis decimdentata Pilsbry & Lowe Nicaragua
Anachis varians (Sowerby),1832. Galapagos
Anachis nigropunctata (Sowerby),1832. Galapagos
Anachis elegantula (Morch) Galapagos
Anachis fusidens Dall,1908. Galapagos
Anachis suffusa (Sowerby) Peru
A. (Seminella) penicillata Carpenter,1865. San Pedro to Gulf of Calif.
A. (Seminella) subturrita Carpenter,1866. San Pedro to Tres Marias Islands
A. (Seminella) fredbakeri Pilsbry. Lower California
A. (Seminella) pygmaea (Sowerby),1832. Gulf of Calif. to Peru.
A. (Seminella) carmen Pilsbry & Lowe,1932. Gulf of Calif. to Panama.
Anachis s.s. fulva (Sowerby),1832. Gulf of Calif. to Panama
Anachis (Seminella) nigricans (Sowerby),1844. Gulf of Calif. to Panama
A. (Seminella) diminuta (C.B. Adams),1852. Gulf of Calif. to Panama
A. (Seminella) serrata Carpenter,1857. Magdalena Bay
A. (Seminella) albonodosa Carpenter,1857. Gulf of California
A. (Seminella) taeniata (Philippi) Gulf of California
A. (Seminella) bartschii Dall Cape San Lucas

(con.)

A. (Seminella) fuscostrigata Carpenter,1864.	Cape San Lucas
A. (Seminella) tincta Carpenter,1864.	Cape San Lucas
A. (Seminella) rufotincta Carpenter	Mazatlan
A. (Seminella) inserta (Stearns),1892.	Gulf of Calif. to Galapagos
A. (Seminella) humerosa Carpenter,1865.	Acapulco.
A. (Seminella) sinaloa Strong and Hertlein	Gulf of California
A. (Seminella) guerroensis Strong & Hertlein	Acapulco
A. (Seminella) treva B. H. & S.	Tres Marias Islands
A. (Seminella) phanea Dall,1919.	Salina Cruz
A. (Seminella) milium Dall	Central America
A. (Seminella) cruentata (Morch),1861	Central America
A. (Seminella) conspicua (C.B. Adams),1852.	Panama
A. (Seminella) gracilis (C.B. Adams),1852.	Panama
A. (Seminella) moesta (C.B. Adams),1852.	Panama
A. (Seminella) atramentaria (Sowerby),1844.	Galapagos
A. (Seminella) tabogaensis Bartsch,1931.	Panama
A. (Seminella) dalli Bartsch,1931.	Panama
A. (Seminella) whitei Bartsch,1928.	Ecuador
A. (Seminella) reedi Bartsch,1928.	Ecuador
A. (Seminella) strongi Bartsch,1928.	Ecuador
Anachis fluctuata (Sowerby)	Corinto to Peru
Anachis rugulosa (Sowerby)	Panama to Peru

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Genus Anachis H. and A. Adams,1853

Subgenus Seminella Pease,1867. Amer. Jour. Conch., vol.3, p.234.
" C. miser, pacifica etc. are not very closely related to the strongly-ribbed Panamic forms, nor to the small irridescent species of Polynesia. I would therefore propose that the latter should be separated under the name of Seminella."

There has been a great deal of discussion about the proper allocation of the two small species in our fauna, penicillata and subturrita. They are questionably in the genus Anachis, but if they do belong here they should certainly be placed in a distinct subgenus and authorities differ widely. Grant and Gale place them in subgenus Chauvetia Monterosato,1884 but not less than a dozen other names have been suggested. Mr. A.M. Strong uses Seminella but states of our species (Per. Comm. July,1945) " Anachis penicillata Carpenter- This probably does not belong in Anachis. It may belong in Nassarina or some related genus." Dr. A. Myra Keen comments (Per. Comm. July,1945) " Seminella Pease ... was proposed in a very vague manner. It seems to apply to Polynesian species rather than West American. Baker,Strong and Hanna, 1938, p.246 place it in synonymy of Anachis."

We feel obliged, therefore, to simply leave our species under Anachis with no subgeneric or generic change until some student makes a more careful study of the problem.

Pescadero Pt., San Mateo Co. (Smith)
Anachis penicillata Carpenter,1865. Santa Barbara, Calif. to the Gulf of California. Type locality " Santa Barbara, San Diego, Catalina Island".

" This species is easily distinguished from subturrita Carpenter by its more elongate aperture, longer columella, and stronger sculpture. A. subturrita has an unusually short columella" (Grant and Gale).

Collecting data: Our experience has been to find this a relatively common small species both litterol and dredged. It was very abundant on the bridge pilings at Anaheim Landing, common in the rocky rubble all along the Palos Verdes Hills from Malaga Cove to Pt. Firmin, San Pedro breakwater and also the Balboa breakwater, the rubble reef at San Onofre, and also Punta Banda and other rocky localities around Todos Santos Bay.

It was common at San Simeon, Calif. in the rubble. We brought it up in the dredgings off Santa Monica in 10 to 15 fms., Redondo Beach in 15 to 25 fms., Avalon, Catalina Island in 25 fms. (Burch) ; reported from Monterey by C Cooper but we have not found it there. I have specimens from Pescadero Pt. San Mateo Co., which I believe is an extension of range (A.G. Smith); San Diego (Hemphill and F. Baker); So. Id., Los Coronados in 14 fms. (Baker); San Martin Island, Lower Calif. (Baker); San Geronimo Id., L.C. (Lowe); La Jolla (Chaney); Ocean Beach (Kelsey); Bird Rock (Strong).

Anachis subturrita Carpenter,1866. San Pedro to Tres Marias Islands, Mex. Type locality, San Diego, Calif. in shell washings.

Collecting data: Todos Santos Bay,L.C. (Hemphill); San Hipolito, L.C. (Hemphill); San Diego (Lowe); San Clemente Island (Lowe).

Genus Aesopus Gould,1860. Type (by monotypy), Aesopus japonicus Gould.

" Shell small, rather thick for its size, subcylindric, terminating in a blunt apex; body whorl scarcely larger than the penultimate whorl; whorls slightly convex; sutures not deeply impressed; surface shiny, vitreous; sculpture inconspicuous or microscopic, consisting of very low axial ribs and spiral striations , absent in some places; aperture small, one-third or less the length of the shell, elongate-ovate, tending to be effuse below and narrowing above; outer lip typically simple but occasionally with denticulations within; inner lip a vitreous callus deposit; columella short; anterior canal not differentiated from the anterior part of the aperture; posterior canal undeveloped."

The following key to species of Aesopus is from Mr. A.M. Strong's notebook. Following his list of species we will take up a more detailed discussion of the species north of San Diego.

Genus Aesopus Gould,1860.
All sculpture obsolete
. Greenish-waxen, with chestnut flamules
12 x 3.3 mm. Monterey .... goforthi
Oldroyd, vol.2, part 1, p.280
. Faintly flamed and tinged with orange, apex pink
10 mm. Gulf of California .... babbi
Tryon, vol.5, p. 135
Axial ribs present
. Spiral sculpture absent
.. Axial ribs numerous, faint
Yellowish, whitish or ocellated with pale brown
7 x 2 mm. Magdalena Bay to Guadalupe Island .... arestus
Proc. USNM, vol. 56, p. 332.
.. Axial ribs distinct, about 20 in number
White, with brown maculations
7.5 x 2.75 mm. San Diego to Panama .... eurythideus
Oldroyd, vol.2, part 1, p. 278
.. Axial ribs about 16
7.4 x 2 mm. San Juan del Sur .... fredbakeri
Proc. Phil. Acad. Sci. vol.84, p.14
. Spiral sculpture of fine striae, axial ribs nodulous
White, with a brown zone below the periphery
7.5 x 2.2 mm. Acapulco .... xenicus
(con.)

Axial sculpture absent

. Entire surface with minute, even, spiral striations

.. Light pinkish brown

4.3 x 16 mm San Pedro to Cape San Lucas ...... sanctus
Oldroyd, vol.2, part 1, p. 279

.. White with longitudinal brown streaks

8 mm. Peru .... oblita
Tryon, vol.5, p. 123

. Entire surface with strong, spiral grooves

.. White or yellowish, sometimes brown tinted

9.25 x 3.5 mm. San Pedro to San Diego .... chrysalloideus
Oldroyd, vol.2, part 1, 279

.. Whitish, tinged or spotted with brown

4 mm. San Pedro to Pt. Abreojos .... myrmecoon
Oldroyd, vol.2, part 1, page 279

Aesopus chrysalloideus (Carpenter),1864.	San Pedro to San Diego
Aesopus sanctus Dall,1919.	San Pedro to Cape San Lucas
Aesopus myrmecoon Dall,1916.	San Pedro tp Pt. Sbreojos
Aesopus eurytoideus (Carpenter),1864.	San Diego to Panama
Aesopus goforthi Dall,1912.	Monterey
Aesopus arestus Dall.	Magdalena Bay
Aesopus babbi Tryon.	Gulf of California
Aesopus xenicus Pilsbry & Lowe,1932.	Gulf of California
Aesopus oblita Reeve	Peru
Aesopus fredbakeri Pilsbry & Lowe,1932.	San Juan del Sur

Aesopus eurytoideus (Carpenter),1864. San Diego to Panama. Type locality, Cape San Lucas, Lower Calif.

Dr. A. Myra Keen advises regarding the spelling of this specific name " Both eurytoidea and chrysalloidea were proposed under a genus of feminine gender. When transferred to Aesopus, the ending should change to -us rather than -s. " So. Id., Los Coronados,Mex. 3 fms. (F. Baker).

Aesopus chrysalloideus (Carpenter),1864. Santa Monica, Calif. (Burch) to San Diego. Type locality, San Pedro and San Diego.

Collecting data: Dredged off Santa Monica, Calif. in 10 fms. (Burch); Ballast Point, San Diego Bay in 10 fms. (Baker); San Diego Bay in 5 fms. (Kelsey); San Pedro (Lowe).

Aesopus sanctus Dall,1919. Santa Monica, Calif. (Burch) to San Martin Id. L.C. Type locality, Todos Santos Bay.

Collecting data: Dredged in 20 fms. off Santa Monica, Calif. 8/38 (Burch); South Island, Los Coronados in 14 fms. (Baker); Point Vincent, Calif. (Strong); Whites Point, Calif. (Strong); San Martin Island, L.C. (Baker)

Aesopus myrmecoon Dall,1916. Malaga Cove, Santa Monica Bay, Calif. (Burch) to Point Abreojos, L.C. Type locality, San Pedro, Calif.

Collecting data: Malaga Cove, Santa Monica Bay littoral in rubble in March and Sept.; El Morro Pt. north of Ensenada,Mex. (Burch); So. Id. Los Coronados in 3 fms. (Baker); Laguna Beach (Lowe).

Aesopus goforthi Dall,1912. Monterey, Calif. (Goforth).
" Reported from Monterey by Cooper but we have not seen it there. I have a strong suspicion that it did not come from Monterey but from farther south. In the original description the Monterey locality was questioned by Dall " (A.G. Smith).

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Genus *Amphissa* H. and A. Adams, 1853. Type (designated by Dall,1913), *Buccinum corrugatum* Reeve,not *Buccinum corrugatum* Brocchi,1814 = *Amphissa columbiana* Dall. (fide Grant and Gale, p. 700).
" Shell of moderate size, elongate Buccinoid; nucleus small, spire high, whorls ventricose, suture depressed; sculpture of axial ribs and spiral threads or cords; aperture ovate, slightly subquadrate, about half the length of the entire shell; outer lip sharp or slightly thickened internally and generally with small lirations, gently curving but typically nearly straight for a short distance just above the middle of the aperture; inner lip with a callus wash on the body whorl and pillar; columella nearly straight, with typically a few small, short plaits at about the midpoint of the aperture; anterior canal hardly differentiated from the aperture, which is effuse anteriorly; posterior canal not developed."

The following key to some of the species of *Amphissa* is from Mr. A.M. Strong's notebook.

Axial ribs about 20
Spiral sculpture of fine lines
20 x 8 mm. Alaska to San Pedro .... *columbiana*
Axial ribs about 17
Spiral sculpture of fine regular cords
Alaska to San Diego .... *reticulata*
Axial ribs 14 to 16
Spiral sculpture of narrow ridges separated by wide interspaces
12 x 6.5 mm. Oregon to Cedros Island ...... *versicolor*
Axial ribs 11 to 13
Spiral sculpture of flattened, strap like cords
14 x 8 mm. Farralones to San Diego .... *bicolor*
Axial ribs about 9
Spiral sculpture of distinct, acute cords
11 x 5 mm. Monterey to Coronado Islands ...... *undata*

The only species discussed by Mr. Strong that is not of our fauna is *Amphissa lyrta* B.H. and S. from the Gulf of California.

Amphissa columbiana Dall,1916. Chiachi Islands, Alaska to San Pedro,Calif. (Dall). Type locality not selected.

Collecting data: Our experience has been to take this species in Puget Sound, De Poe Bay, Oregon and Crescent City, Calif. (Burch); S.E. Alaska-shore- my *columbiana* have more and finer ribs than *versicolor*.(G. Willett); Orcas Island, Puget Sound in 10 to 30 fms. (Baker); Ketron Id.,Puget Sound (Baker); Neah Bay, Wash. (Lowe); Farralones, Calif.and Crescent City,Calif. (Chace); Point Reyes, Calif. (Lowe); Bear Bay, Barranoff Island, Alaska (Kate Stephens); Typical shells of this species are northern. The shells I have been calling *columbiana* from the Mendocino coast are quite different and are, in fact, much closer to *versicolor*, although they are not *versicolor*, typical shells of the latter being found with the larger form. I have taken a very few shells of this large form of *Amphissa* at Pacific Grove, although it is rare in Monterey Bay. I suspect we have another and unnamed species here but have hesitated to do anything about it as I have not had enough lots of columbiana from the Oregon coast with which to make a check" (A.G. Smith).

Amphissa versicolor Dall,1871. Oregon coast to Cerros Island, Lower Calif. (Dall). Type locality, Monterey, Calif.

Collecting data: It is interesting that we picked up this species on shore or only in very shallow dredgings, under 10 fms. We have picked up the variety incisa in deeper water indicating that perhaps it is the deep water form. Versicolor is a very common species in our experience in rocky rubble all around Santa Monica Bay and at all points south to Todos Santos Bay,Mex. (Burch); Monterey, Calif. (Lowe); San Pedro, Calif. (Lowe); Catalina Island in 30 fms. ? (Lowe); La Jolla, Calif. (Bristol); San Diego (Gripp); Point Cayucos, Calif. (Wilcox); Todos Santos Bay (Orcutt); this is essentially a shore species and not often taken in dredgings. The Amphissas we have dredged on the shale in Monterey Bay we have called A. versicolor incisa because of their more developed sculpture. You might check those you got to s see if our experience checks with yours. Cymata Dall and lineata Stearns are merely color forms in my opinion, with little taxonomic value " (A.G. Smith). Note- we agree with the last except for cymata which we consider very distinct. (Burch).

Grant and Gale placed Amphissa versicolor lineata Stearns,1872, type locality Monterey, in the synonymy of the typical and the consensus of opinion is to accept this verdict.

Amphissa versicolor incisa Dall,1916. Monterey, Calif. (A.G. Smith) to Todos Santos Bay, Mexico (Burch). Type locality, Laguna Beach, Calif.

Collecting data: As suggested under the discussion of versicolor our experience has been to find this form the deeper water form having dredged it all around Monterey Bay in 15 to 25 fms. and off Redondo Beach in 25 fms. off Malaga Cove, Los Angeles Co. in 20 fms. and off Ensenada in Todos Santos Bay in 25 fms. (Burch).

Dr. Dall in Bulletin 112 gives the reference to the description in 1919 but Dr. A. Myra Keen calls attention to his brief description in 1916 in the Nautilus, vol. 30, p.27. " incisa Dall, with sharply cut regular sculpture and beautifully mottled coloration (U.S.N.M. Cat. No. 223,294"

Amphissa cymata Dall,1916. Monterey, Calif. to Dana Point, Orange Co.,Calif. (Burch). Type locality, Monterey, Calif.

Collecting data: This was described very briefly as a variety of versicolor " with distinct brown axially waved lines on a white ground". The shells we have labelled cymata seem to be sufficiently distinct to be a species. In fact, we have often wished we could see the type because our A. cymata is so very different from typical versicolor that it seems as if Dr. Dall would surely have called it a species if he had the same shells. (Burch); an interesting thing about it in our experience has been to find it in the rocky rubble at Dana Point, Orange Co. on several occasions and nowhere else. (Burch); Catalina Island in 40 fms. (G. Willett).

Amphissa reticulata Dall,1916. Port Althorp, Alaska to San Diego, Calif. Type locality, Sta. 4332, 183 fms. off Point Loma.

Collecting data: Dredged in 25 fms. off Redondo Beach and also brought up from below 50 fms., off Malaga Cove and also off Avalon, Catalina Island in 35 fms. We have a set from Puget Sound dredged by Trevor Kincaid and we collected a few specimens in littoral collecting at Monterey, Calif. in rocky rubble at low tide. This is a common species in the Del Rey deposit of the Baldwin Hills Pleistocene (Burch); Craig and Forrester Island, Alaska (Willett

Catalina Island, Calif. in 35 fms. (Strong); Craig, Alaska in 20-25 fms. (Lowe); 10-40 fms. Monterey Bay, scarce. Close to A.V. incisa (A.G. Smith)

Amphissa undata (Carpenter),1864. Monterey, Calif. to Cerros Island, Lower Calif. Type locality, Catalina Island in 30-40 fathoms.
Collecting data: In our experience this is a comparatively common species from moderately deep water. Our records show , off Monterey in 20 fms., Santa Cruz Island in 50 fms., Redondo Beach 25 to 75 fms., Avalon, Catalina Island in 35 fms., Todos Santos Bay, Mexico in 50 fms. (Burch);

Monterey Bay in 15-40 fms. scarce. 100 fms. off La Jolla (A.G. Smith); Catalina Island, Calif. in 30 fms. (Lowe); San Diego, Calif. in 100 fms. (Kelsey).

Amphissa bicolor Dall,1892. Farralones Islands to San Diego, Calif. Type locality, deep water off southern California.
Collecting data: Off Redondo Beach, Calif. in 75 to 100 fathoms (Burch); Catalina Island in 40 fms. (G. Willett); 66 to 356 fms. in Monterey Bay and 298 fms. off Pt. Sur (USFC), common (A.G. Smith); San Diego, Calif. (Baker); Orange Co., Calif. in 15 fms. (Lowe).

Amphissa sp. - Mr. A.G. Smith reports " I have several lots of a small, slender shore form from Reef Pt., White's Pt., La Jolla, and the North Id. breakwater. " Mr. Smith suggests that this is what we have been calling cymata. If so and it sounds logical we suggest that Mr. Smith describe it.

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Genus Strombina Morch,1852. This genus is not represented north of San Diego, but we are including Mr. A.M. Strong's key to species and list of species.

Outer lip sinated in the middle
Cape San Lucas .... sinuata
Tryon, vol. 5, p. 152
Outer lip sinated at the posterior end of the aperture
. Sinus deep and rounded Gulf of California .... clavulus
Reeve, Pleurotoma, pl. 12, sp. 106
. Body with a tooth notching the aperture at the sinus
16 mm. Acapulco to .... hiroundo
Reeve, sp. 219, Columbella
Outer lip only slightly sinated or not at all
. Axial sculpture absent
.. Spiral sculpture confined to the base and canal
... Body whorl with prominent humps
.... A hump on the back, outer lip thickened externally
28 mm. Gulf of California to Panama .... dorsata
Tryon, vol.5, p. 185
.... White humps on back and sides
16 mm Lower Calif. to Peru .... gibberula
Tryon, vol.5, p. 184

(con.)

... Body whorl with the humps small or wanting
.... Shoulder of the body whorl with a row of tubercles
25 mm. Gulf of California to Central America ... maculosa
Tryon, vol.5, p. 186
.... Body whorl corronated at the suture with 9 pustules
37 x 10.8 mm. Cerros Island to Gulf of Calif. .. paceana
Nautilus, vol.30, p. 28
... Body whorl without tubercles or pustules
.... Aperture whitish, not dentate
35 x 13 mm. Central America to Ecuador .... turrita
Tryon, vol.5, p. 186
.... Lip callously thickened, dentate within
22 x 11 mm. Gulf of California to Panama .... pavonia
Tryon, vol.5, p. 185
.. Spiral sculpture not confined to base and canal
... Spiral lines on later whorls only
15 x 7 mm. Gulf of California to Ecuador ..... solidula
Tryon, vol.5, p. 147
... Shoulder defined by a carina, spirals strong (?)
37 x 15 mm Gulf of California .... colpoica
Nautilus, vol. 30, p.28 equals subulata Sby. not Reeve says Strong
. Axial sculpture present
..Spiral sculpture confined to the base and canal
... Axial sculpture on the first few whorls only
.... Canal long, body whorl with a hump
40 x 14 mm. Central America .... fusinoidea
equals fusiformis Hinds, voy. Sulphur pl.10, f.17, Not Reeve
.... Canal shorter, body whorl without a hump
34 x 13.5 mm. Gulf of California to Panama ..... edentula
Bull. Mus. Comp. Zool., vol. 43, p. 310
... Axial sculpture distinct on all whorls
.... Axial ribs 10, canal long
32.2 x 11.7 mm. Gulf of Calif. to West Mexico .. subangulata
Trans. San Diego Soc. N.H. vol. 8, p.21
.... Axial ribs 14, canal short
32 mm Panama .... angularis
Tryon, vol.5, p. 186
.... Axial ribs 18, canal short
19 x 7.5 mm. Cape San Lucas .... bonita
.... Periphery of last whorl rounded
..... Shell short and broad
30 mm. Central America to Ecuador .... recurva
Tryon, vol.5, p. 187
..... Shell slender, turrited
...... Axial ribs regular, rather close
37.5 mm Central America .... elegans
Tryon, vol.5, p. 186
..... Panama to Peru .... lanceolata
Reeve, pl.1, fig.3
.. Spiral sculpture not confined to the base and canal
... Axial sculpture of blunt riblets on the last whorl only
14 x 7 mm. Gulf of California to Ecuador .... solidula
Tryon vol.5, p. 147
... Axial riblets extending over several whorls
.... Spiral sculpture of strong, channeled grooves
25 mm Gulf of Calif.................................. lilacina
Nautilus vol.30, p.28; Proc. USNM, vol.66, pl.35, f.5

.... Spiral sculpture of cords or raised threads
..... Spire short, sharp pointed
23 mm. Gulf of Calif. to Central America ... pulcherrima
Reeve, pl.3, fig.10
..... Spire long, turrited
30 x 11 mm Gulf of California .... carmencita
Trans. San Diego Soc. N.H., vol. 8, p.21.

List of species of Strombina

Strombina gibberula (Sowerby),1832.	Lower Calif. to Peru
Strombina maculosa (Sowerby),1832.	Lower Calif. to Panama
Strombina paceana Dall,1916.	Cerros Island to Gulf of Calif.
Strombina solidula(Reeve).	Magdalena Bay to Ecuador
Strombina lilacina Dall,1916.	Gulf of California
Strombina colpoica Dall,1916.	Gulf of California
Strombina edentula Dall,1908.	Gulf of Calif. to Panama
Strombina dordata (Sowerby),1832.	Gulf of Calif. to Ecuador
Strombina clavulus (Sowerby),1832.	Gulf of California
Strombina carmencita Lowe,1935.	Gulf of California
Strombina subangulata Lowe,1935.	Gulf of Calif. and West Mexico
Strombina bonita String and Hertlein.	Cape San Lucas
Strombina pulcherrima (Sowerby)	Tres Marias Islands to Central Amer.
Strombina turrita (Sowerby),1832.	Acapulco to Ecuador
Strombina hirondo (Gaskoin)	Acapulco
Strombina recurva (Sowerby),1832.	Acapulco to Ecuador
Strombina sinuata (Sowerby),1874.	Acapulco
Strombina fusinoides Dall	Acapulco to Central America
Strombina elegans (Sowerby),1832.	Central America
Strombina lanceolata (Sowerby),1832.	Panama to Peru
Strombina pavonia (Hinds)	Panama
Strombina angularis (Sowerby),1832.	Panama

Genus Cosmioconcha Dall,1913. This genus is not represented north of San Diego. The following key and list of species is from Mr. A.M. Strong's notebook.

Axial sculpture absent
. Spiral sculpture of 6 or 7 cords on the base
19 x 9 mm. Gulf of California .... palmeri
Proc. USNM. vol. 66, pl.21, fig.8; Proc. USNM, vol.45, p.589.
. Spiral sculpture of about 20 grooves on the base
.. Whitish, with brown flames
24 x 7 mm. Gulf of California .... pergracilis
Proc. USNM, vol.45, p. 590; Proc. USNM, vol. 64, pl.21, fig.9
.. Uniformly pale olivaceous
15 x 5 mm. Gulf of California .... parvula
Proc. USNM, vol.45, p. 590; Proc. USNM, vol. 66, pl.21, fig.1
. Spiral sculpture ?
.. Whitish or yellowish, stained with chestnut
24 x 10 mm. Central America to Panama .... modesta
Tryon, vol.4, p. 10
.. Nearly black, white spots on the periphery
18 x mm. Peru and Chile .... buccinoides
Tryon, vol. 5, p. 127

List of species of Cosmioconcha

Cosmioconcha palmeri Dall,1913.	Gulf of California
Cosmioconcha pergracilis Dall,1913.	Gulf of California
Cosmioconcha parvula Dall,1913.	Gulf of California
Cosmioconcha modesta (Lowys),1835.	Panama
Cosmioconcha buccinoides (Sowerby),1832.	Peru

Additions and Corrections

#51, p.12- Pyrene fuscata (Sowerby),1832. Perhaps we should call attention to the fact that Dr. Dall listed this species from La Jolla, Calif (Orcutt) in Add. & Emend. to USNM Bull. 112, Proc. USNM, vol.63, art. 10. However, there is no question but that this is an error. P. fuscata is definitely of the southern fauna.

The following collecting records were received from Mr. A.G. Smith after the stencils were cut. Please add them .

Nassarius fossatus (Gould)- Elkhorn Slough; 10 fms. off Del Monte, in sand rare; Duxbury Reef; common in shallow water all along the Mendocino Co. coast.

Nassarius californianus (Conrad)- 30-40 fms. off Moss Landing,Monterey Bay; also off Soquel Pt.; rare in the Bay. Common in shallow water along the Mendocino Co. coast but full-grown specimens are not often taken. In the young stages, californianus is sometimes difficult to distinguish from perpinguis, but normally can be separated by the more pronounced rougher sculpture.

Nassarius mendicus (Gould)- and N. m. cooperi (Forbes)- Both the species and the subspecies common in Monterey Bay and in moderately shallow water along the Mendocino Co. coast.

Nassarius perpinguis (Hinds)- Common in Monterey Bay from 5 to 25 fms.

Nassarius insculptus (Carpenter)- 40-73 fms. off Pt. Pinos (USFC), scarce; 35 fms. Cordell Bank.

Nassarius tegulus (Reeve)- Not found in Monterey Bay. I have grave doubts about the San Franciso record, having seen no specimens from this Bay either.

Nassarius obsoletus (Say)- Common in the Oakland Estuary and on the Alameda shore in San Francisco Bay.

Mitrella carinata and subspecies- San Francisco Bay; Sausalito; Little River, Mendocino Co. (mostly the form gausapata).

Mitrella aurantiaca Dall- Avalon (one specimen); Pt. Pinos; 11 mi. N. of Ft. Bragg. A scarce species.

Mitrella tuberosa (Carpenter)- Shore to 20 fms. in Monterey Bay,abundant.

Mitrella hypodra (Dall)- One beach-worn specimen from Monterey (Dall)

Mitrella gouldii (Carpenter)- 39-356 fms. in Monterey Bay (USFC), fairly common.

Mitrella luculenta (Dall)- 10-73 fms. in Monterey Bay, common. Also common in moderate to fairly deepwater off the Mendocino coast.

Additions to Min. #50, pp 20-27-

Neptunea tabulata (Baird)- 50-80 fathoms off Moss Landing; 202 fms. off Watsonville beach (USFC Sta. 3204); taken by set-line fishermen in 200 fms. off Davenport, Santa Cruz Co. A scarce species.

N. amianta (Dall)- 42 fms. off Pigeon Pt. (Bolin); 278-871 fms. in Monterey Bay (USFC); 200 fms. off Davenport (Strohbeen, from set-line fishermen). A scarce species.

N. ithia (Dall)- 204-382 fms. off Pt. Sur, Pt. Pinos, and in Monterey Bay (USFC); 200 fms. off Davenport (Strohbeen, from set-line fishermen) A scarce species.

N. lirata (Martyn)- An immature specimen in 755-847 fms. off Pt. Pinos (USFC).

Additions and Corrections- (con.) Mr. A.G. Smith

Searlesia dira (Reeve)- Min. #50 p 23- " The Monterey record is based on a single worn shell collected by Dall. We have not found it there, although it is reported living at Pigeon Pt., a few miles to the north. Common at Duxbury Reef and all along the Mendocino coast, living on wave washed rock crevices fairly well inshore."

Buccinum strigillatum Dall- 278 fms. in Monterey Bay (USFC), a single specimen. 125-135 fms. off Ft. Bragg.

Buccinum viridum Dall- 330-870 fms. in Monterey Bay (USFC). This species appears to be common all along the coast from the 400 fathom line on down .

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We received the following notes from Dr. Joshua L. Baily Jr. after cutting the stencils for our report on Nassariidae and Columbellidae. It is interesting to note that we arrived at the identical conclusions.

" I do not see how anyone can use Nassarius and Arcularia both, since both have the same generitype. However, Tryon in his Manual of Conchology, used Arcularia as a subgenus of Nassa, but put the species Nassa arcularia under Nassa s.s. and not under Arcularia. I believe he was wrong in doing so. There is considerable variation in the genus to warrant possibly eight or ten subgenera, but I am inclined to suspect that even so, until we know more about the soft parts, we should not take the subgenera too seriously . Certainly for our California species two subgenera are sufficient for the present. I would put tegula under Nassarius s.s. and the others under Schizopyga.

The east coast species, Nassarius trivittatus, to my mind resembles our N. perpinguis sufficiently to be classed in the same subgenus, yet N. trivittata is generally called a Tritia . I wonder if Tritia and Schizopyga are synonyms ?

The family name Columbellidae should be used in place of Pyrenidae regardless of whether the two genera are synonymous or not. Columbella has been placed on the Official List of Generic Zoological names, and is therefore to be given priority over Pyrene if the two are considered equal. But Dr. H.A. Pilsbry tells me that in his opinion each is a good genus, Columbella having plaits on the columella which Pyrene does not. We do not have either here, but both occur in the Gulf."

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Minutes #49,pp 50-51, pl.3, figs. 35-39. We have the following note to add to the data on this species. Dr. Paul Bartsch, Curator, Division of Mollusks and Cenozoic Invertebrates, Smithsonian Institution, U.S. National Museum advises " The type of Spisula strongi Burch has come through in fine shape. We have given it the catalogue no. 573603."

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Minutes #42, p.6 and list #45, p.14- Tivela stultorum (Mawe)- We have the following note from Dr. A.Myra Keen:

" Dr. and Mrs. Gifford have just sent a specimen of Tivela stultorum that was collected in June, alive, at Stinson Beach, Marin Co., Calif. That extends the range of the species one degree northward to lat. 38."

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Family MURICIDAE

The proper generic and subgeneric arrangement of the species of this family in our fauna has been the subject of rather extensive discussion. No two west coast authors seem to agree in recent years except upon one point and that is that the arrangement used by Dr. Dall in Bulletin 112 is unsatisfactory. Dr. Clench has just published the issue of the Johnsonia " The Genus Murex in the Western Atlantic." Johnsonia #17, May 29,1945. Clench and Farfabte in this paper retain thg generic name Murex using sub-genera for all divisions. Powell,Iredale and many others have been giving generic standing to many of the subgenera used. It seems to be the old question of whether to use many genera or many subgenera and sections.

Dr. Joshua L. Baily Jr. advises on the problem (Per. Comm. July,1945) " To my mind the most difficult family in all the mollusca to deal with is the Muricidae. I anticipate more trouble when I get to it than from any other family. Some yearsago I discussed this with Dr. Stillman Berry, and he expressed the opinion that any arrangement of genera, no matter how carefullt planned, could be nothing more than tentative until the soft parts were better known, and he recommended calling all of them Murex. Of course, this does not solve all of the difficulties. It merely reduces them from generic to subgeneric rank. There have been about 20 subgenera of Murex names. This is a conservative estimate. A careful count might reveal about twice that number. I presume that your distribution of the species among the subgenera is about as good as any other man's might be, except for one matter. You have placed Murex gemma and Murex festivus in the same subgenus. I know that Dall did this in Bulletin 112, and Grant and Gale in their catalog did the same, but to me the shell of Murex gemma is so different from Murex festivus that I would recommend placing them in different subgenera even if their soft parts showed no special difference. Which one of them should be removed I do not know.

May I explain why I used Ceratostoma Hermanssen instead of Purpura Martyn ? It was on account of Johnson's article in the Nautilus, in which he claimed that Martyn should be rejected as not consistently binomial. But I myself was not consistent for I retained some of Martyn's other names. I feel that it is not wise to reject all of any author's names because some of them are not binomial; I think we should accept the good ones and reject the bad ones. Martyn's work, The Universal Conchologist, is quite rare, perhaps only a half a dozen copies in this country. According to Johnson, each copy differs from every other copy. Consequently there is good ground for rejecting this work. But there is evidence that Martyn published another work on conchology in the same year and I have tried to accept these names in this latter work while rejecting those in the former.

Finally, the figure which purports to be Murex petri which Dall published in the Proceedings, and which Keep reproduced in the 1911 edition of West Coast Shells and which I used in the 1935 edition is not Murex petri at all. We have authentic specimens of Murex petri in the San Diego Museum. I looked the matter up before when Dr. S.S. Berry first called my attention to the erroneous picture, and found that M. petri is a very different thing. "

Mr. A.M. Strong advised the editor that the divisions in his notebook are but tentative pending further study. Mr. Strong uses the subgenera of Dall but gives them generic standing. He uses Jaton for the three species gemma,santarosana and festivus.

Dr. A. Myra Keen (Per. Comm. July,1945) states " Having been interested in the classification of the Muricidae for the last ten years, and having accumulated a lot of notes on the group, I have a few suggestions to make as to allocation of West Coast species. *

Family Muricidae Gray,1824

Genus Murex Linnaeus,1758. Type (Sub. design., Montfort,1810) Murex pecten Montfort - M. tribulus Linnaeus. Clavate, varices spiny. Represented in Panamic fauna by M. recurvirostris Broderip,M. elenensis Dall.

Genus Pterynotus Swainson,1833. Type (monotypy) Murex pinnatus Wood. Trivaricate, varices not spiny. California species: P. (P) erinaceoides; P.(P.) petri; P.(P) rhyssus.

Subgenus Pterynotus, s.s. has back of varices roughened, varices winged.

Subgenus Pteropurpura Jousseaume,1880. Type (orig. desig.), Murex macropterus Deshayes. Varices smooth except on the face, winged. Californian species : Pterynotus (Pteropurpura) carpenteri; P. (P.) tremperi; P. (P.) trialatus.

Subgenus Jaton Pusch,1837. Type (fide Sherborn) Murex decussatus Linne. Varices rolled backward. Californian species: Pterynotus (Jaton) festivus (Hinds); P.(J) gemma (Sowerby);(?); P. (J.) santarosanus (Dall) (?); P. (J.) incisus (Broderip) (?) from Panamic province.

(Note that these last three allocations are with doubt; I suspect that a new subgenus must be proposed but hesitate to name one until exhausting all the possibilities in the literature.)

Genus Purpura Martyn,1784. Type (monotypy), P. foliata Martyn - Murex foliatus Gmelin,1790.

Trivaricate, with a large apertural tooth. Californian species: P. foliata and P. nuttallii (Conrad).

Genus Pterynotus Swainson,1833. Type (monotypy), Murex pinnatus Wood. " Trivaricate, varices not spiny" (Keen).

" Shells in this subgenus are usually about three inches or less in size, have three wing or blade-like varices which are generally laminated and have the spines very much reduced or absent. The siphonal canal is moderately long and usually quite narrow.

Swainson proposed and described the subgenus Pterynotus in the Zoological Illustrations without a type designation. Later in the same volume,he changed the spelling to Pteronotus and figured M. pinnatus Swainson as its type. The name Pterynotus, however, will have to be used for this subgenus , not only because it has page precedence, but because the later name, Pteronotus, is a homonym." Clench and Farfante,Johnsonia,17:35,36.

Pterynotus petri (Dall),1900. (P. rhyssus (Dall) in synonymy). Monterey, Calif. (?) to Ballenas Lagoon, Lower Calif.

Dr. A. Myra Keen advises regarding the type locality as follows " Our concept of the species rhyssa and petri must be based upon the respective holotypes. These are figured by Oldroyd; the holotype of rhyssa on pl. 30, fig.1, of petri in Pt. II, pl.28, fig.7. The type locality of the latter according to the holotype label is Santa Barbara, 61 fms., mud."

This species has been a problem or rather its relationship to rhyssa . Dr. Dall described petri in Nautilus 14, p.37 with no figure. Later in Proc. U.S.N.M., vol. 24, p. 532 (a brief note that does not seem to agree with his original description) and figures it on pl.34, fig.7, 1902. In 1919 Dall in Proc. U.S.N.M., vol.56, p.332 described rhyssa (no figure) but the description is perfect for the common deep water southern California species with the rasp-like surface. To add to the confusion Dr. Dall in Bull. 112 placed petri and rhyssa in different subgenera, a practice that seems absurd to all students of this group. Mr. George Willett commented " I am sure that I have seen intergrades and doubt if rhyssa is distinct from petri." Mr. Allyn G. Smith (Per. Comm.) states " According to Mackenzie

Gordon, who looked at the types of petri and rhyssus, these two species are synonymous, petri having precedence. This is your common dredged form off Redondo. I have not seen anything like it from Monterey and doubt if it lives here." " The common small Alipurpura from the shale in Monterey Bay is certainly not rhyssa, but carpenteri. I think you are right in assuming that Dall was confused, the net result being that there is a bad mess for someone to straighten out. Heres what I think, for whatever it may be worth.

1. Murex carpenteri was based on types from Monterey Bay, furnished by F.L. Button. This is the common form from the shale bed. Described in 1899.

2. In 1900, Dall described M. petri from " San Pedro, in deep water ."

3. In 1902, he figured both species (supposedly) in the USNM proceedings , his plate being republished by Mrs. Oldroyd (v.2, pt.1, pl.28). This was his first error, as the shell figured as carpenteri is definitely not the Monterey species but based on a southern California shell.

4. In 1919 he described Murex rhyssus from San Pedro based on shells furnished by Mrs. Oldroyd.

5. In 1911, Hemphill described M. carpenteri tremperi from " Newport Bay and San Pedro, in 35 fathoms", based on a banded color form of the southern California species.

6. Assuming true carpenteri is not found south of Point Conception, which I suspect is the case, then the large southern California species is left without a name. Fortunately a name is available and is the one used by Hemphill. So I propose this be used- Murex tremperi Hemphill, of which the types are in the C.A.S. Paleo. Type Collection. Hemphill figured his species in the Transactions of the San Diego Society and Dall's figure of Carpenteri (Oldroyd, pl.28, fig.9) illustrates another variation of tremperi, probably the smoothish brown form from San Diego.

7. Dall's figure of petri is correct (Oldroyd, pl.28, fig.7) and Mrs. Oldroyd's figure of rhyssus (pl. 30, fig.1) is M. petri.

Collecting data: for P. petri (Dall)- Very abundant off Redondo Beach, Calif. in 25 fathoms on gravel botton, less common in deeper water down to 75 fathoms; common in the dredging off Santa Monica, Calif., Dan pt. Calif. and also in Todos Santos Bay in 20 to 35 fathoms (Burch); Redondo Beach(Baker and Chaney); San Pedro, Calif. in 20 fms. (Lowe); Newport in 25 fms. (Lowe); Point Loma Lighthouse (Chaney); Coronado, Calif. in kelp holdfast (Bristol) .

Pterynotus erinaceoides (Valenciennes),1832. San Diego, Calif. to Panama. Type locality, Acapulco, Mexico.

The San Diego record for this species is definitely questionable. It is a species of the southern fauna and no member of the club reports having seen or heard of the species from San Diego.

Collecting data: Magdalena Bay, L.C.; Conception Bay; Punta Penasco, Sonora, Mexico; Guaymas, Mexico; Kino Bay, Mex. (H.N. Lowe); San Ignacio Lagoon, L.C. (Hemphill).

Subgenus Pteropurpura Jousseaume,1880. Type (by original designation) Murex macropterus Deshayes.

" Varices smooth except on the face, winged " (Keen).

" Shells generally under two and one-half inches in length and possessing three varices. The varices are webbed , blade-like and composed of numerous laminae. The siphonal canal is closed on the ventral side and not slit-like as in other subgenera. The canal becomes a tube which opens at the base of the aperture. Operculum unguiculate, with an apical nucleus." Johnsonia #17, p. 39.

Pterynotus (Pteropurpura) carpenteri (Dall),1899. Farallones Islands to Point Conception. Type locality, Monterey, Calif.

This species was discussed under P. petri and subject to correction we are accepting the diagnosis of Mr. A.G. Smith. The differences between the large southern California shells with the curved wings and those from off Monterey, Calif. the type locality of carpenteri, have often been noted by collectors. If theyare not distinct species they are at least subspecifically different.

Collecting data: Very common on the shale off Del Monte, Monterey, Calif. On our last trip to Monterey we picked up over 300 living specimens in two days dredging. (Burch).

Monterey

Pterynotus (Pteropurpura) tremperi (Hemphill),1911. Point Conception to San Diego. Type locality, Santa Barbara channel off Newport,Calif.

This species is discussed under petri and also carpenteri. Hemphill described this species as a color variety of carpenteri. The white bands and other white markings are of no significance and appear frequently in this species as wellas in those from off Monterey. However, Hemphill did figure the southern California species and his description is adequate. therefore his specific name tremperi may be used ignoring the reference to the white color bands.

Mr. A.G. Smith makes an interesting comment on this species also " M. tremperi is found occasionally in Monterey but is scarce. You and I dredged one in 40 fms. several years ago, if you remember. I dredged others in prior years and I think Mackenzie Gordon has a few specimens from the Bay also. We do not believe that tremperi and carpenteri, as found in the Bay, are the same, although it is true we have not seen any authentic young specimens of tremperi from there."

Collecting data: Redondo Beach, Calif. in 50 fms. rocky (Burch); Catalina Island in 30 fms. (G. Willett); Catalina Island in 30 fms.(Lowe); Redondo Beach in 65 fms. (Lowe); San Pedro, Calif. (Lowe); Newport Calif. in 35 fms. (Lowe).

Pterynotus (Pteropurpura) trialatus (Sowerby),1841. Bodega Bay, Calif. south to lat. 27 (Keen). Type locality not known.

Collecting data: There are many color variations in this species. Pure white specimens are not uncommon with the brown bands appearing in many arrangements. It is not one of our common species but all collectors pick up a few of them. The habitat is rocky rubble although they are occasionally picked up in estuaries spawning. We have taken them from Mission Bay. Perhaps the finest individual specimens in our collection came from the Santa Monica breakwater. This may be due to the fact that this breakwater is not accessible except by boat and is somewhat protected for that reason.A favorite locality has been the rocks along the landward shore of Newport Bay; somewhat less common on the outside at Corona del Mar. We have taken some nice specimens from the Balboa breakwater. The species has always seemed to be exceedingly abundant in the rubble at San Onofre, Calif. but without a doubt the locality where they have been the most abundant in our experience was Punta Banda, on Todos Santos Bay. On our last visit to Punta Banda there were ten or more in the party and we must have taken an average of better than 100 living specimens each. Here the idea is to search the crevices between the large rocks. This seems to be a littoral species. We have never dredged it at any depth.(Burch); La Jolla (Wilson); Mission Bay (Beckwithand Wilson); San Diego (Baker); Todos Santos Bay, L.C. (Hemphill); Punta Banda, L.C. (Lowe); San Pedro (Lowe); Mission Bay (Bristol); white variety-San Pedro (Lowe).

" I doubt the Bodega Bay record. Not found in Monterey Bay" (A.G. Smith)

Subgenus *Jaton Pusch*,1837. Type (fide Sherborn), *Murex decussatus* Linnaeus. "Varices rolled backward" (Keen).

" Shell like that of the typical subgenus but with the three lamellar projections much reduced, either entirely absent or merely low shields next to the low, rounded varices, another set of varices without the lamellar shields alternating with the originals and practically as strong." Grant and Gale, 1931, p.707. Grant and Gale used the genus *Purpura* to include the entire group.

Pterynotus (Jaton) festivus (Hinds),1843. Santa Barbara, Calif. to San Ignacio Lagoon, L.C. (Jordan). Type locality, Magdalena Bay, Lower Calif .

Collecting data: This is perhaps the most common species of the family and easily found in almost all rocky localities. The largest and finest specimens in our collection though were taken on the mud flats spawning in June in Mugu Bay, Ventura Co., Calif. They were very abundant and many of them with *Crepidula onyx* attached to them. We have seen them literally by the thousands on the mud flats of Mission Bay also. There are a few odd notes regarding the species in our cards. We took young specimens in great numbers on the backs of the large spider crab, *Loxorhynchus grandis* off Redondo Beach. These specimens seemed to all be of a deep red color. The bathymetric range is somewhat amazing also. The species is quite common on down to below 25 fms. and we have brought them up living from as deep as 75 fms. (Burch); La Jolla (Chancy); Ballast Point from deep water (Sefton); Mission Bay abundant in 1935 on pilings (Bristol); San Diego Bay (Hemphill and Baker); San Pedro (Lowe); Todos Santos Bay (Orcutt); San Quintin Bay (Orcutt).

Pterynotus (Jaton) gemma (Sowerby),1879. Santa Barbara, Calif. to San Hipolito, L.C. (Jordan). Type locality not known.

Collecting data: Our experience has been to find this a common species all along the rocky localities of southern California. We have found it common along the Palos Verdes from Point Firmin north to Malaga Cove; fine specimens at Dana Point. An interesting note on the Dana Point specimens is that the rocks are incrusted with thick layers of worm tubes incrusting the rocks and creating hollows under them. By knocking off these worm tubes with a heavy rod or hammer the *gemma* will scatter about. And being protected they are likely to be perfect specimens with spines and curled apertures. San Onofre, Calif. in the rubble reef is a good place to find them in great numbers. Also Punta Banda on Todos Santos Bay, L.C. (Burch); Cedros Island, L.C. (Lowe); San Diego (Baker and Stephens); La Jolla (Bristol); Laguna Beach (Lowe); Catalina Island in 30 fms. (Lowe); San Pedro (Oldroyd).

Pterynotus (Jaton) santarosanus (Dall),1905. Santa Barbara Islands, Calif. to Cerros Island, L.C. Type locality, off Santa Rosa Island,Calif. in 82 fms.

Collecting data: This species bears a superficial resemblance to *gemma* but is quite distinct on examination. It is interesting that the two species seem to intergrade or whatever paleontologists call it in *M. eldridgei* Arnold. I may be mistaken about this but at least I have been unable to arrange my fossils to satisfactorily separate these two species as I can do with my Recent shells.

Our experience has been to find this species comparatively rare. We have dredged it in 25 fms. off Redondo Beach on gravel bottom, off Santa Cruz Island, and in Todos Santos Bay in 20 fms. Always on gravel or rocky bottom. Mr. and Mrs. Ralph Bormann collected a fine set of them at White's

Point, Los Angeles Co., Calif. in littoral collecting. All of their shells were hermit crab specimens but in good shape; (Burch); So. Island, Los Coronados in 10-14 fms. (Baker); San Pedro in 15 fms. (Lowe); Catalina Island in 30 fms. (Lowe); Catalina Island in 30 fms. and San Pedro in 15 fms. (G. Willett).

The following keys from the notebook of Mr. A.M. Strong will be of interest.

Family Muricidae- Key to Genera

Shell varicose or with axial ribs
. Whorls with a small open tube between the varices .... *Typhis*
. Whorls without tubes
.. Whorls with 2 strongly developed lateral varices
... Intermediate varices absent .... *Aspella*
... Intermediate varices present .... *Eupleura*
.. Whorls with 3 equal varices
... Outer lip with an anterior tooth or horn .... *Purpura*
... Outer lip without a horn .... *Murex*
.... Shell club shaped, with a long, narrow canal .... *(Murex)*
.... Shell triangular to ovate, canal short
..... Varices with erect, waved digitations .... *(Pteropurpura)*
..... Varices frondose .... (?)
..... Varices expanded, with points or spines ....(*Alipurpura*)
..... Varices flatly reflected ....(?)
.. Whorls with 5 or more varices or axial ribs
...Outer lip with an anterior tooth or horn
....Varices distinct
..... Canal open .... *Forreria*
..... Canal closed .... (?)
.... Varices more or less obsolete .... *Chorus*
... Outer lip without an anterior tooth
.... Canal more or less completely roofed over
..... Shell pyriform, sutures deeply pitted .... *Triremis*
..... Shell globose, large, canal short .... *Phyllonotus*
..... Shell ovate, canal rather long .... *Homalacantha*
..... Shell elongate ovate, canal short
...... Surface imbricated .... *Muricopsis*
...... Surface not imbricated .... *Vitularia*
..... Shell fusiform, lip thickened and dentate .... *Tritonalia*
.... Canal wide, open .... *Trophon*

Keys to species of *Typhis*, *Aspella*, *Eupleura*

Whorls with a small, open tube between the varices .... *Typhis*

. Varices with a spine at the shoulder
.. Shell broad, with a short canal
30 mm. Lower California .... *latipennis*
Proc. USNM, vol. 56, p. 389
.. Shell slender, with a long canal
27 mm. Gulf of California .... *martyria*
Proc. USNM, vol. 24, p. 550
. Varices hooked at the shoulder
.. Canal narrow, recurved at the end
20 mm. Panama to Ecuador .... *quadratus*
Reeve, vol.3, p.13; Tryon, vol.2, p. 157

.. Canal straight, truncated at the end
Ecuador .... coronatus
Reeve, vol.1, p.2; Tryon, page 137, v.2
.Varices rounded at the shoulder
.. Canal very long and slender ? spined
25 mm. Venezuela .... cumingii
Reeve, p.4, vol.1; Tryon, p.137, v.2.
.. Canal broad, rather short
... Varices fluted
Gulf of California .... pinnatus
Reeve, v.2,p.7; v.1, p.3; Tryon, v.2, p.138
... Varices lamellar
35 mm. Gulf of California .... grandis
Reeve, v.1, p.1; Tryon, v.2, p.138

Whorls with 2 strongly developed lateral varices
. Intermediate varices absent .... Aspella
.. Whorls smooth, crowned with small raised plates
25 mm. Acapulco to Panama .... pyramidalis
Reeve, Ranella, vol.8, p.43; Tryon, v.3, p.44.
.. Whorls with narrow, close-set, spiral ridges
Nicaragua to Panama .... erosus
Reeve, Murex, v.22, p.160; Tryon,v.2, p.129.

Whorls with 2 strongly developed lateral varices
. Intermediate varices present .... Eupleura
.. Varices broad, not spined
30 mm. Cerros Island to Venezuela .... muriciformis
Reeve, Ranella, v.7, p.34; Tryon, v.2, p.158
.. Varices with 5 spinose points, canal long
Gulf of California .... pectinata
Reeve, Ranella, v.7, p.35.
.. Varices with 7 prickly spines, canal short
30 mm. Panama to Ecuador .... nitida
Reeve, Ranella, v.8, p.45; Tryon, v.2, p.158.
.. Varices reduced to nodules on angle of whorls
21.5 mm. Off San Diego .... grippi
Oldroyd, v.2, part 2, p.28.

Genus Typhis Montfort,1810.

Typhis coronatus Broderip,1832.	Venezuela to Ecuador
Typhis cumingii Broderip,1832.	Venezuela
Typhis fimbriatus A. Adams,1853.	Gulf of California
Typhis grandis A. Adams,1854.	Gulf of California
Typhis latipennis Dall,1919.	Lower California
Typhis lowei Pilsbry.	Montijo Bay to Panama.
Typhis martyria Dall.	Gulf of California
Typhis pinnatus Broderip.	Gulf of California
Typhis quadratus Hinds,1843.	Panama to Ecuador

Genus Aspella Morch,1877

Aspella erosus Broderip,1832.	Nicaragua to Galapagos
Aspella obeliscus A. Adams.	Gulf of California to Panama

Genus Eupleura H. & A. Adams,1853

Eupleura grippi Dall,1911.	San Diego
Eupleura muriciformis Broderip,1832.	Cerros Island to Venezuela
Eupleura nitida Broderip,1832.	Panama and Ecuador

Whorls with 3 equal varices
• Outer lip with an anterior tooth or horn .... Purpura
•• Surface between varices nearly smooth
75 mm. Sitka to San Diego .... foliata
Oldroyd, vol.2, pt.2, page 14.
•• Surface spirally ribbed over a rounded node
65 mm. Monterey to Scammon's Lagoon....... nuttalli
Oldroyd, vol.2, part 2, p.14
•• Surface tuberculately spirally ribbed
35 mm. Lower California .... monoceros
Reeve, Murex, vol.2,p.7; Tryon, v.2, p.115.
•• Surface with a solid, prominent tubercle
40 mm. Ecuador .... pinnigera
Reeve, Murex, v.16,p.62; Tryon, v.2, p.112.

Whorls with 3 equal varices
• Outer lip without a horn .... Murex
•• Shell club shaped, with a long, narrow canal ....(Murex)
••• Canal without spines
75 mm. Gulf of Calif. to Peru .... elenensis
equals plicatus Reeve, v.21, p.87; Tryon, v.2, p.80.
••• Canal with spines
•••• Varices cut into spined tubercles
50 mm. Gulf of California to Ecuador .... recurvirostris
Reeve, v.19, p.75; Tryon, v.2, p.80.
•••• Varices rounded, with a single short spine
Lower California to Panama .... rectirostris
Reeve, v.22, p.91

•• Shell fusiform to triangular, canal short
••• Varices with erect, waved digitations .... (Pteropurpura)
•••• Spiral sculpture present
65 mm. Santa Barbara to San Pedro .... petri
Oldroyd, v.2, pt.2, page 12
•••• Spiral sculpture absent
60 mm. Point Conception to San Diego .... carpenteri
Oldroyd, v.2, pt.2, page 10
••• Varices frondose .... (?)
•••• Fronds branching Gulf of California ..... palma rosus mexicanus

••• Varices with narrow digitations or spines ....(Alipurpura)
•••• Spiral sculpture present
••••• Spiral ridged alternating in size
60 mm. Santa Barbara to Ballenas Lagoon .... rhyssus
Oldroyd, v.2, pt.2, p.9.
••••• Spiral ridges equal San Diego to Panama .... erinaceoides
Oldroyd,v.2, pt.2, p.9. equals californica Reeve,v.30,p.144;
Tryon, v.2, p.113.
•••• Spiral sculpture absent
••••• Varices expanded to flat spines at the shoulder
75 mm. Bodega Bay to Todos Santos Bay .... trialatus
Oldroyd, v.2, pt.2, p.10.
••••• Varices with a single rounded spine at the shoulder
55 mm. Cerros Island .... leeanus
Proc. USNM, v.12, p.329.
••••• Varices with 3 additional spines
45 mm. Central America .... centrifugus
Reeve,v.28, p.130; Tryon, v.2, p.113.

Whorls with 3 equal varices
. Outer lip without a horn
.. Shell triangular to ovate, canal short .... Murex
... Varices flatly reflected ....(?)
.... Varices frilled, spiral sculpture obsolete
45 mm. Santa Barbara to Magdalena Bay...... festivus
Oldroyd, v.2, pt.2, p.13.

Whorls with 5 or more varices
. Outer lip with an anterior tooth or horn
.. Varices distinct
... Canal open ....Forreria
.... Varices spined at the shoulder of the whorls
150 mm. San Pedro to Scammons Lagoon .... belcheri
Oldroyd, v.2, pt.2, p.49
... Canal closed .... (?)
.... Varices raised into short, lamellar spines
40 mm. Peru .... fontainei
Tryon, v.2, p.126
.. Varices more or less obsolete .... Chorus
... Whorls swollen in the middle
100 mm. Chile .... giganteus
Reeve,Monoceras, v.1,p.3; Tryon, v.2, p.194.

Whorls with 5 or more varices
. Outer lip without an anterior horn
.. Canal more or less completely roofed over
... Shell pyriform, sutures deeply pitted............... Triremis- Jaton
.... Varices thick, smooth, crossed by raised ridges
30 mm. Santa Barbara to Cerros Island .... gemmis
Oldroyd, v.2,pt.2, p.13
.... Varices low, thin, a curved spine at the suture
45 mm. Santa Barbara to Cerros Island .... santarosanus
Oldroyd, v.2, pt.2, p.12
.... Varices with 9 or 10 recurved spines
50 mm. Acapulco to Ecuador .... stearnsii
Nautilus, v.32, p.26.
.... Varices with a double row or recurved spines
35 mm. Magdalena Bay to Ecuador .... humilis
Reeve, Murex, v.13, p.50; Tryon, v.2, p.103.
.... Varices with alternating, erect spines
55 mm. Central America .... oxyacantha
Reeve, Murex, v.4, p.17
.... Varices digitated, wings at the suture
35 mm. Gulf of California .... fimbriatus
Tryon, v.2, p.103
.... Varices frondose, palmated at the shoulder
Acapulco to Peru .... varicosus
Tryon, v.2, p.199; Proc. USNM, v.37, p.219

Whorls with 5 or more varices
. Outer lip without an anterior tooth
.. Canal more or less completely roofed over
... Shell globose, large, canal short .... Phyllonotus
.... Spiral sculpture of fine, equal striae
..... Varices 5, short, recurved Galapagos .... pumilis
125 mm. Tryon, v.2, p.135

..... Varices 6-9, with pointed knobs on the shoulder
150 mm. Gulf of California to Peru .... bicolor
Reeve,Murex, v.11, p.44; Tryon, v.2, p.101.

..... Varices 6-8, with a double row of spines
125 mm. Gulf of California to Peru .... regius
Black on aperture. Reeve, Murex, v.15, p.59; Tryon, v.2, p.100

..... Varices 5-8, each with 3 fronds
135 mm. Gulf of California to Panama .... princeps
Reeve, Murex, v.6, p.24; Tryon, v.2, p. 106.

.... Spiral sculpture of unequal ridges

..... Varices 6-9, armed with ample fronds
175 mm. Gulf of Calif. to Acapulco.................. nigritus
Reeve, Murex, v.13, p.51.

..... Varices 10-15, armed with many fronds
125 mm. Acapulco to Peru .... radix
Reeve, Murex, p.69, vol.17; Tryon, v.2, p.219.

..... Varices 10, armed with compressed scales
50 mm. Peru .... tortuosus
equals crispus Reeve,Murex, v.17,p.67.

.... Spiral sculpture of broad, flat ridges

..... Varices 8-13, with fronds alternating in size
175 mm. Magdalena Bay to Acapulco .... nitidus
Reeve, Murex, v.17, p.70; Tryon, v.2, p.105

.... Spiral sculpture of nodulous ridges

..... Varices 6-8, flat, denticulated
175 mm. Gulf of California to Peru .... brassica
Reeve, Murex, v.14, p.56; Tryon v.2,p.100

.... Spiral sculpture of carinate ridges

..... Varices 7, rounded thick Ecuador .... incisus
Reeve, Murex, v.31, p.155

... Shell ovate, canal rather long .... Homalacanthina

.... Varices 6, frondose, spiral ridges strong
Panama Bay.......................... norrisii
Reeve, Murex, v.28, p.129

... Shell elongate, ovate, canal short

.... Surface imbricated ....Muricopsis

..... Varices 7, indistinct, spiral ridges few
15 mm. Gulf of California .... pauxillus
Tryon,v.2, p.109; Maz. Cat. # 676

..... Varices 7, tuberculate, spiral striae numerous
25 mm. Gulf of California to Panama .... dubia
Reeve, Murex, 26-116; Tryon 2-109

...... Sculpture more delicate
Lower California to Panama .... squamulata
Tryon 2-109

.... Surface not imbricated .... Vitularia

..... Varices broad, armed with short spines
20 mm. Acapulco to Peru .... vittata
Reeve, Murex, 29-140; Tryon 2-110.

..... Varices more or less obsolete, nodose at shoulder
90 mm. Cerros Island to Panama .... salebrosa
Reeve, Murex, 24-98; Tryon, 2-133.

The following list of species as arranged in Mr. A.M. Strong's notebook will be of interest for comparison since we did not follow it in all particulars.

Genus Murex Linnaeus,1758.
Murex elenensis Dall,1909 (plicatus Sby.) Gulf of California to Peru
Murex nigrescens Sowerby,1841. Gulf of California to Ecuador
Records of M. recurvirostris Broderip, a West Indian species belong here.
Murex rectirostris Sowerby,1840. Scammons Lagoon to Panama
Genus Alipurpura Bayle,1884.
Alipurpura erinaceoides(Valenciennes)1832. San Diego to Panama.
Alipurpura rhyssa(Dall)1919. Santa Barbara to Ballenas Lagoon
Alipurpura trialata(Sowerby)1841 Bodega Bay to Todos Santos Bay
Genus Pteropurpura Jousseaume,1880.
Pteropurpura carpenteri (Dall),1889. Monterey to San Pedro
Ptoropurpura petri (Dall),1900. Monterey to San Pedro
Genus Jaton Pusch,1837. Triremis Bayle,1884.
Jaton festiva (Hinds),1843. Santa Barbara to Cerros Island
Jaton gemma (Sowerby),1879. Santa Barbara to Cerros Island
All northern records of M. incisa belong here.
Jaton santarosana (Dall),1905. Santa Barbara to Cerros Island
Jaton pinnigera (Broderip),1832. West Columbia to Peru
Genus Centrifuga Grant and Gale,1931.
Centrifuga leeanus (Dall),1899. Guadalupe Island to Cerros Island
Centrifuga centrifuga (Hinds),1843. Panama to West Columbia
Genus Muricopsis
Muricopsis dubia (Sowerby),1835. Gulf of California to Panama
Muricopsis pauxilla (A. Adams), 1853 Gulf of California
Muricopsis squamulata (Carpenter) Lower California to Panama
Genus Vitularia Swainson,1840.
Vitularia salebrosa King Cerros Island to Panama
Genus Chicoreus Montfort,1810.
Chicoreus palmarosa mexicana (Stearns),1893. Gulf of California
Genus Homalacanthina Morch,1852.
Homalacanthina norrisii (Reeve) Bay of Panama
Homalacanthina varicosa (Sowerby),1835. Acapulco to Peru
Genus Phyllonotus Swainson,1840.
Phyllonotus brassicus(Lamarck),1822 Gulf of Calif. to Peru
Phyllonotus dipsacus (Broderip),1832 Ecuador
Phyllonotus hippocastanum (Philippi) (bicolor Val.) Gulf of Calif. to Panama
Phyllonotus nigrites (Philippi),1845. Gulf of Calif. to Acapulco
Phyllonotus nitidus (Broderip),1832. Magdalena Bay to Acapulco
Genus Chorus Gray,1847
Chorus giganteus Lamarck Chile
Genus Purpura Martyn,1784.
Purpura foliata Martyn,1784. Alaska to San Diego.
Purpura fontainei Tryon,1880 Peru
Purpura monoceros Sowerby,1840. Lower California
Purpura nuttallii Conrad,1837. Monterey to Scammons Lagoon

Genus Purpura Martyn,1784. Type (by monotypy), Purpura foliata Martyn. = Pterorytis Conrad 1862 = [illegible] umbilicatus [illegible]

" Shell triangular, varices wing-like; aperture elongate-ovate. Canal moderately long, usually closed in adult specimens; outer lip with a produced tooth near the base." (Tryon, Manual of Conchology).

This is the description of the subgenus Cerostoma (Conrad). Purpura Martyn is the first binomial use of the name, used by the ancients colloquially to indicate the muricoid shells from which the Tyrian purple was derived. In harmony with this tradition it is applied by Martyn to a shell which Linnaeus would have called Murex , and which has been usually known as Cerostoma foliatum Martyn, after Carpenter. This is Martyn's only species of Purpura in Volumes I and II, and hence the type. In 1798 Bolten adopted the same view, and began his list of Purpuras with the group of Murex trunculus. There seems to be no doubt that, if any of Martyn's names are valid, Purpura foliata must typify the group bearing the ancient designation" (Dall).

This was discussed under the first part of this paper and we have on several occasions taken up the matter of the Martyn names. For the present, at least, we are using the Martyn names where they seem to be valid. Grant and Gale expanded the use of Purpura to incluse the entire group. We are not following them in this. Mr. A.M. Strong's key to the species will be found at the top of page 39.

Purpura foliata Martyn,1784. Sitka, Alaska to San Diego, Calif. = [illegible] foliatus Gmelin 1791
Type locality, Northwest Coast of America.

"I doubt the San Diego record, and suspect it does not live farther south than Pt. Conception" (A.G. Smith). However, Mr. George Willett reports having collected the species off San Pedro in 20 fms. H.N. Lowe also reported it from off San Pedro in 35 fathoms. Therefore, it is quite possible that specimens have been taken as far south as San Diego.

Collecting data: Our experience has been to collect fine specimens in abundance at Port Orchard, Puget Sound, Washington; the breakwater at Crescent City, Calif.; De Poe Bay, Oregon; Port Orford, Oregon; large specimens dredged off Monterey, Calif. on the shale in about 20 fms.; Spooner's Beach, 6 miles south of Morro Bay, Calif. (Burch); Southeast Alaska north to Sitka (G. Willett); Port Orchard, Kitsap Co.,Wash. and Craig, Prince of Wales Id., Alaska- on rocks at low tide (W.J. Eyerdam); Drakes Bay, Calif. (Arnheim); Point San Luis, Calif. (Cook and Lowe); San Juan Islands, Puget Sound in 20 fms. (Oldroyd); Sitka and Ketchikan, Alaska (Lowe).

Purpura nuttalli (Conrad),1837. Monterey, Calif. (?) to Magdalena Bay, L.C. (Grant and Gale). Type locality, Santa Barbara, Calif.

" The Monterey record is undoubtedly an error. Has anyone taken it north of Pt. Conception ? Would place albescens and albofasciata in synonymy." (A.G. Smith).

" The outer margin of the last two varices on adult specimens flares backward but is not frilled as in foliata. The spiral cords are fewer and much less pronounced than in foliata." (Grant and Gale, p.705).

Dr. Dall named two color forms of this species, albescens (white) and albofasciata (brown with a white band in the middle). Almost every immaginable variation of brown and white may be selected from these shells and the consensus of opinion is that they are of no significance and are therefore in the synonymy of the typical. There is another subspecies, aciculiger Valenciennes,1846. In this the varices are " thick and rounded" according to the description. Oldroyd figures this, pl.30, figs. 12,12a,12b. (con).

The figures remind one of the common form or at best a race affected by the habitat. Mr. A.G. Smith and the majority are disposed to place this also in the synonymy of the typical.

Collecting data: This is one of the very common species in southern California. It not only frequents almost every rubble locality but is very abundant on wharf piles and far up in the estuaries it is common on floats, bridge pilings etc. It must be littoral or very shallow water species because we have never picked it up in dredgings at any depth. A list of collecting localities would cover the coast of southern Calif. (Burch); Mission Bay and La Jolla (Bristol); Cedros Island, L.C. (Lowe); San Pedro and White's Point (Lowe).

*** Note- We have the following comment on the generic name from Dr. W.P. Woodring (Per. Comm. July,1945):

" Purpura" Martyn. " If Martyn's names are rejected, as I think they should be, the genus is Pterorytis Conrad,1862 (monotypic), Murex umbrifer Conrad, Miocene, Virginia."

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Genus Ocenebra Gray,1847. Type (by original designation), Murex erinaceus Linne. Tritonalia of Dall,Oldroyd and authors in synonymy.

Dr. A. Myra Keen states (Per. Comm. July,1945) " The last time Dr. Berry was here we went over the question of Tritonalia vs. Ocenebra and I reluctantly became convinced that we must adopt the latter. Tritonalia was proposed by Fleming as a substitute for Triton, which he discovered to be preoccupied, and, since he designated no type, must take the same genotype; namely , Triton tritonis Linne. The fact that Fleming grouped a number of species including erinaceus under his concept of Triton does not make any of them available for subsequent designation as Dall supposed. Therefore, the next available name for the erinaceus group is Ocenebra Gray,1847, type (by original designation), Murex erinaceus Linne. Incidentally, this interpretation will make Tritonalia available for the group of Indo-Pacific and Carribbean species now placed under Charonia."

Mr. A.G. Smith writes (Per, Comm. July,1945) " We are using Ocenebra based on Winckworth, Names of British Mollusca- II- Jour. Conch. 20(1): 9-15,1934.."

" Shell generally small, purpuriform, with many varices, which may be foliated or spinose; spiral sculpture generally present; anterior canal partly or nearly closed." (Grant & Gale).

Ocenobra gracillima Stearns,1871. Monterey to Gulf of California. Type locality, San Diego,Calif.

This is a very common small species in rocky rubble all along the coast of southern California. It is also a common species in wharf pilings and in such places as the bridge pilings in Anaheim and Newport Bays. It is too common to list collecting localities.

The variety obesa (Stearns MS) Dall,1919 , type locality Laguna Beach, Calif. is generally placed in the synonymy of the typical and considered of no significance. It is described as ' wider'. The described measurements are for gracillima, length .50; width .25 in. and for obesa height of shell 19, of aperture and canal 8, diameter 7.5 mm. Shells to fit either of these may easily be selected from any large set of the species. (Burch).

Mr. A.G. Smith advises on this species " Type lot from San Diego, collected by Hemphill. Part of the original lot is in the C.A.S., labelled " cotypes" by Hemphill. I have a lot of 2 specimens from Santa Barbara, and another sizable lot from Avalon, Catalina Island, in addition to others from southern California. Would put obesa in synonymy".

Ocenebra stearnsi Hemphill,1911. Type locality, Monterey, Calif.

In the preliminary discussions the following comments were made by John Q. Burch. This species has been something of a puzzle to many of us. We have shells from Monterey that fit the description perfectly " dark yellow or brownish, plain or with a single white revolving band at the periphery of the body whorl", but this color pattern may be selected from almost any large set of gracillima the length of the coast. Hemphill stresses the " pitted sculpturing" as distinguished from gracillima in his note following the description (not copied in Oldroyd), but I cannot see this because my gracillima also seems to my eye to be pitted.

The following note from Mr. A.G. Smith confirms the above suspicion, " O. stearnsi Hemphill - Type locality, Monterey; types (2 specimens) in C.A.S. Two additional lots of 2 specimens each also in the C.A.S. My own collection has three lots of 1,2, and 3 specimens, respectively, which I collected at Pacific Grove and Point Pinos. This species is nothing more or less than O. gracillima and should go into the synonymy of this species. The Monterey shells are lighter in color, more tumid,and with somewhat rougher sculpture than the typical shells from San Diego. It so happened that the shells Hemphill picked out as types have a white line encircling the middle of the last whorl but his other shells from Monterey do not have this white line and none of mine has either. I suspect that all records of gracillima from Monterey are the weakly-differentiated variant Hemphill named as stearnsi. Until I checked the types the other day I thought stearnsi was something entirely different."

Dr. A. M. Keen reports " Two paratypes of the Ocenebra stearnsi Hemphill are in the Stanford type collection."

Ocenebra lurida (Middendorff),1849. Forrester Island, to Catalina Island. Type locality, Sitka, Alaska.

Collecting data: Our experience has been to find this species very common and very variable. We have never seen it from southern California . Our records: Crescent City, Calif.; Monterey in 10-20 fms.; Cayucos,Calif . littoral. However, there seems to be a definite question about these records being for the typical lurida as found at Sitka,Alaska. (Burch). Mr. A.G. Smith states " I have no real lurida and have seen no specimens from Sitka, the type locality. If you know of anyone who has Alaskan lurida to spare, I should much like to have one or more for comparative purposes. Does anyone know just how far down the Pacific Coast lurida (typical) comes?"

Mr. George Willett of the Los Angeles Museum who has collected and studies this species extensively reports as follows : Craig and Ketchikan Alaska (shore); Santa Cruz Island in 10 fms.; Catalina Island in 30 fms. .

W.J. Eyerdam reports: Port Ludlow, Kitsap Co., Wash.; Ishut Bay, Afognak Island, and Drier Bay, Knight Island, Alaska -under stones and rock at lowest tide marks."

Ocenebra lurida aspera (Baird),1863. Sitka, Alaska to San Pedro,Calif. Type locality, Esquimalt Harbor, Vancouver, B.C.

Collecting data: Off Monterey, Calif. in 10 and 20 fms.; Cayucos, Calif. (littoral); Avila, Calif. (littoral) (Burch); would call it a good subspecies. Common at low tide under rocks at Monterey and vicinity, where yellow, light brown, and bright reddish-brown forms predominate. Along the Mendocino Co. coast the color forms most often found are yellow and purplish black. My experience is that aspera is a littoral species, not taken by dredging"; Forrester Island on shore (G. Willett).

Ocenebra lurida munda Carpenter,1864. Middleton Island, Alaska to San Diego, Calif. Type locality not given.

This was figured in Proc. U.S.N.M. vol.15, pl.20, fig.3,1892. The original description is so short it is insignificant, but there is a very slender form of lurida that we have been labelling munda with a question. Opinions on the validity of this subspecies differ greatly. Our records for what we call munda are: Crescent City, Calif.;San Simeon and Cayucos, Calif.; off Monterey, Calif. in 20 fms. (Burch).

Mr. George Willett is of the opinion that it "equals lurida." But on the other hand Mr. A.G. Smith states " If I am right in what I call munda and I think I am as Mackenzie Gordon checked my material with the types in the USNM, I would almost be inclined to call it a good species. It is a pretty distinct shell, smaller than aspera, but more slender in aspect, like a starved aspera, as Carpenter says in his wholly inadequate description. I have it from shore to 10 fathoms at Monterey and several localities along the Mendocino Co. coast. I have found it to be scarce, whereas aspera is common."

Crescent City, Calif. (Chace); Pacific Grove, very young (Baker).

Ocenebra lurida rotunda (Dall),1919. Moss Beach to San Luis Obispo, Calif. Type locality, Moss Beach, Halfmoon Bay, Calif.

This is another of Dr. Dall's species that have never been figured. Many of us have speculated at times about just what it might be. Mr. A.G. Smith reports " Don't think it is a very good subspecies. I have a set of topotypes, which are not very greatly different from lurida aspera except for the somewhat more tumid body whorl. A single shell from 3 mi. N. of Cayucos (AGS #3310) is similar. Would throw it in with aspera."

Ocenebra squamulifera Gabb,1868. Santa Barbara to San Pedro, Calif. Type locality, Catalina Island. Dr. A. Myra Keen reports " The holotype of Ocenebra squamulifera Gabb is at the University of California.

In the preliminary discussion John Q. Burch stated " There is a very common species off Monterey on the shale in about 20 fms. It is neither foveolata or barbarensis , and we labelled our shells with this name with a question." Mr. A.G. Smith settles the matter as follows " The Monterey shells to which you refer are not squamulifera , I am sure, but a new species, which we have described and are figuring in our Monterey paper. Gabb (Pal. Cal.) says of this species: " The above description (repeated in Oldroyd) and notes were sent to me by Carpenter, in a letter, and were based on a unique fossil specimen found by myself at Santa Barbara, and an immature recent one from Catalina Island, found by Dr. Cooper." From this, I would assume that in all probability the type is the Santa Barbara fossil, probably from the well known " Bath House Beach" (Pleistocene) formation. Specimens from here would therefore be needed to tell just what squamulifera really is. On the basis of existing evidence, my inclination would be to omit it from the Recent fauna."

Mr. A.M. Strong advises on this species " A good series of the Pliocene of Santa Barbara showed foveolata passing into squamulifera and the latter into barbarensis Gabb. Have all these intergrading forms died out since the Pliocene or are none of our series of living shells large enough to show them?"

Mr. George Willett comments " I think the Monterey shells may be O. interfossa beta and that squamulifera is known only as fossil." There are three specimens so labelled in the Lowe collection in the San Diego Museum and also a specimen from San Diego by Gripp.

Ocenebra fusconotata (Dall),1919. Monterey to Catalina Island, Calif. Type locality, Monterey, Calif.

We have sets of this species from Monterey but have been disposed to consider them foveolata with color bands. The description mentions " six or seven prominent vertical ribs". (Burch). Mr. George Willett comments " Looks like foveolata to me".

Mr. A.G. Smith reports on this species as follows " This species is closely related to O. foveolata. In fact, whether or not it should be considered as a subspecies of foveolata or in synonymy with it, depends on the latitude of variation allowed this latter species. It is not a common form at Monterey. We rate it as scarce. Typical specimens with the interrupted dark-brown band on the body whorl are generally dredged. The type, which is 26 mm. long is a very large one; most of our specimens being only about a half inch. Thus, adults average much smaller than foveolata from southern California. Occurance at Monterey: occasional at low tide under rocks and in beach drift; 3-35 fms. on rocksand shale. I have not seen typical fusconotata from other localities. * Would call it a good species until intergrades with foveolata are found. (* except Santa Barbara)."

Ocenebra poulsoni Carpenter,1864 ex Nuttall MS. Santa Barbara, Calif. to Magdalena Bay, L.C. Dr. A. Myra Keen advises on the type locality " The type locality of Ocenebra poulsoni Carpenter,1864 was not given in the original; the expanded description in 1865 implies San Diego."

Collecting data: This is without a doubt the most common species of the genus. It is literally everywhere in great numbers, on breakwaters, rocks, wharf piles, bridge pilings in estuaries etc. It is a shallow water and littoral species, but we have picked it up in our dredgings as deep as 15 fms. (Burch); Magdalena Bay, L.C. (Lowe); Scammons Lagoon, L.C.; San Pedro, Calif. (Lowe); San Diego (Baker, Stephens etc.); Mission Bay (Bristol);

Ocenebra painei (Dall),1903. Dundas Bay, Alaska to San Diego, Calif. Type locality, off Catalina Island, Calif.

Collecting data: off Redondo Beach, Calif. in 75 fathoms, fine gravel and mud (Burch); Catalina Island in 30 fms. (G. Willett); Catalina Island in 50 fms. (Lowe); La Jolla, Calif. in about 100 fms. (A.G. Smith) (1 specimen).

Ocenebra circumtexta (Stearns),1871. Trinidad to Revillagigedo Id. (Strong and Hanna). Type locality, Monterey, Calif.

The variety citrica Dall,1919 is merely the albino form which occurs regularly in all colonies. In my opinion it has no significance.(Burch).

Collecting data: A very abundant species on the rocks at Monterey, San Simeon, Cayucos, Morro Rock, Palos Verdes, Pt. Firmin,Pt. Vicente. Dredged from as deep as 25 fms. off Redondo Beach (Burch); " Have not collected it north of Moss Beach, San Mateo Co. Not dredged in Monterey Bay. The color form citrica has no taxonomic value in my opinion (A.G. Smith) ; Pt. Cayucos, Calif. (Wilcox); 1 mi N. Cambria (Cass); San Miguel Island, Calif. (Hemphill); Whites Point (Orcutt); Catalina Island (Hemphill); No. Id. Los Coronados (Stephens); So. Id. Los Coronados (Baker); San Nicolas Island (Lowe); San Pedro in 30 fms. (Lowe); Port Harford and Monterey, Calif. (Lowe).

Ocenebra interfossa Carpenter,1864. Semidi Islands, Alaska to Pto. Santo Tomas (Jordan). Dr. A.M. Keen advises " The type locality of interfossa according to the holotype label, is Monterey Bay.

This is our common form with the lattice like reticulate sculpture. A number of subspecies have been described.

Collecting data: Monterey, Calif. littoral and dredged down to 20 fms. on the shale off Del Monte; San Simeon and Cayucos; Redondo Beach, Calif in 50 fms.; Dana Point, Calif.; Crescent City, Calif.; De Poe Bay,Oregon (Burch); Prince William Sound, Alaska in 18 fms. (Lewis) (Willett); Southeast Alaska, general, shore (G. Willett); type locality, Monterey; type in USNM. An extremely variable species, both in size and sculpture. Largest and finest specimens I have came from Puget Sound. The typical form appears to be littoral and not often dredged, at least at Monterey (A.G. Smith); Point Ludlow,Kitsap Co., Wash.; Izhut Bay,Afognak Id., and Drier Bay, Knight Island, Alaska- same habitat as lurida. (W.J. Eyerdam); San Pedro (Lowe); La Jolla (Bristol); Pt. San Luis(Lowe); Cayucos (Wilcox); Monterey (Hemphill); San Francisco (Lowe); Puget Sound (Lowe).

Ocenebra interfossa fraseri (I. Oldroyd),1920. Vancouver Island, B.C. to Mendocino Co., Calif. Type locality, Departure Bay, Vancouver Island.

Dr. Dall figured but did not describe a subspecies O. interfossa alpha in Bull. 112,pl.13, fig.9. The following statement of Dr. A. Myra Keen disposes of alpha " Specimens in the Stanford collection presumably identified by Dr. Dall are identical with specimens of fraseri Oldroyd. As the latter has priority, we can eliminate " Tritonalia" interfossa alpha as a synonym".

Ocenebra interfossa beta (Carpenter) (Dall),1919. " The range is from Half Moon Bay, San Mateo Co. (Keen) to Imperial Beach, San Diego Co., (Burch. The type locality of "T" beta is Monterey" (Dr. A.M. Keen). Mr. George Willett reports beta from South Coronado Island in 10 fms. taking it father south.

Apparently this variety has never beenfigured. Mr. George Willett is of the opinion that local shells should bear this name. The species we label with this name is a comparatively uncommon, even rare shell taken in our experience largely littoral from Monterey,Portuguese Bend,Imperial Beach,Dana Point and San Onofre. Mr. Willett includes another record from Santa Monica,Calif. by Jay.

A comparison of topotypes of O. i. fraseri from Esquimalt, Vancouver Island, B.C. with the shells we have as beta indicate that these must be very close if not identical. (Burch). However, we certainly collected what we know as beta from Monterey, Calif. and we have the following note from Mr. A.G. Smith " Seems different from interfossa, from the description. Have never collected shells that fit, at Monterey."

It may well be that the above two species should be considered distinct rather than subspecies of interfossa.

*** In the preliminary discussions of the interfossa group the following statement was made by John Q. Burch " My personal opinion is to have O. interfossa and ignore the varieties with the exception of the beta matter. The shells we have been calling beta are far different from these others ." Mr. George Willett comments " I agree heartily". Dr. A. Myra Keen comments " As to the validity of the varieties, I agree with you that there are too many. Specimens in the Stanford collection of clathrata,minor, and atropurpura presumably identified by Dr. Dall are, to my eyes, very similar. The beta and alpha * fraseri seem more distinctive." (con.)

Mr. A.G. Smith made the following comments on the *O. fraseri*(Oldroyd) -" Have two specimens from the type lot. One is very much like the figure for *barbarensis* in Bull. 112, pl.6, fig.5, except: (a) it lacks the strong terminal varix; and (b) the canal bends to the left instead of to the right (it also bends to the rear). The other specimen is similar except for the less developed shoulder-points. *Fraseri* is a heavy-textured shell, whitish in color (dirty white), with a yellowish or yellow-brown throat. It appears to be a good species, possibly related to *O. interfossa beta.* Oldroyd's figure is terrible."

It might be well to call attention here to the fact that if these species should prove to be identical *beta* Dall,1919 has priority over *fraseri* Oldroyd,1920. * see note below.

*** We question the validity of the following three subspecies of *interfossa*, but will discuss them below.

Ocenebra interfossa clathrata (Stearns) (Dall),1919. Monterey to Catalina Island (Dall). Type locality, Svalon, Catalina Island.

Collecting data: We have specimens from Cayucos,Calif. so labelled and have also dredged the same form off Redondo Beach,Calif.(Burch). Mr. A.G. Smith comments " Short, with tabulate whorls, and extremely clathrate sculpture, showing squarish pits. Have it from the following localities: San Juan Ids., Puget Sound; Little River, Mendocino Co.; shore to 15 fms., Monterey Bay, fairly common; Cayucos. Berry said at one time he thought this was a good species; he may be right."; Cayucos (Lowe); San Diego (Hemphill).

Ocenebra interfossa minor (Dall),1919. Catalina Island,Calif.

This species has never been figured, and the description is very inadequate. Mr. and Mrs. Ralph Bormann collected specimens that seem to fit the description from White's Point, Los Angeles Co., Calif. But the consensus of opinion on it is perhaps wellenoggh stated by Mr. A.G. Smith " Don't know it for sure."

Ocenebra interfossa atropurpurea (Carpenter) (Dall),1919. Neah Bay, Wash. to San Diego, Calif. Type locality, Neah Bay, Wash.

Collecting data: I have a set of specimens so labelled collected 3 mi N. of Cayucos,Calif. by Mr. A.G. Smith, but I am unable to separate this from what we call *cl athrata* (Burch). Mr. Smith comments on this as follows: " Thought I had this from Cayucos but now am pretty sure this identification is not correct. Better change the name on the set I gave you to plain *interfossa.* Topotypes from Neah Bay appear to be needed to tell just what *atropurpurea* is."

* " As noted above, *Ocenebra fraseri* (Oldroyd) takes precedence over *interfossa alpha* Dall. It is probably a good subspecies, representing the extreme development of spiral sculpture and spines on the shoulder of the whorls. Range, Vancouver I. to Pacific Grove,Calif." (Dr. A.M. Keen).

Ocenebra foveolata (Hinds),1843. Moss Beach,San Mateo Co. (Vokes) to Magdalena Bay, L.C. Type locality, Magdalena Bay, L.C.

The original figures in Hinds ' Voyage of the Sulphur' and the species we have been labelling *foveolata* seem to agree very well. Grant and Gale figured a specimen that looks to be far different. They state that it is a very variable species. The validity of a number of other described forms will depend upon the amount of variation permitted. (con.)

Collecting data; Abundant off Monterey on the shale off Del Monte in 20 to 40 fms.; off Avalon, Catalina Island in 35 fms.; off Redondo Beach, Calif. in 25 fms.; off Dana Point, Orange Co. in 20 fms.(Burch); Redondo Beach, San Pedro, La Jolla, and San Diego (Lowe); there is a specimen in the San Diego Museum of Natural History in the H.N. Lowe collection labelled as from Mazatlan,Mexico which would be an extension of the range southward; Mr. A.G. Smith states " Monterey records doubtful and are probably based on O. fusconotata . Have not seen typical from north of San Pedro."

Ocenebra sclera (Dall),1919. Coast of Washington. Type locality, Port Townsend, Wash. in 20 fms. Dr. Dall gave the range southward to Venice, Calif. but Dr. A. Myra Keen advises as follows " The "T" sclera is not represented in the Stanford collection. I studied the holotype at the National Museum, but have no notes on it other than that the Venice record is incorrect. Apparently it is restricted to the Puget Sound area . The Venice record is of epiphanea." None of our correspondents report having a specimen of this species.

Ocenebra subangulata (Stearns),1873. Orcas Island, Wash. to Gulf of California. (O. michaeli (Ford) in synonymy)

Dr. Dall gave the range of subangulata " Monterey to Santa Barbara Islands" and the above range for michaeli Ford. We have been disposed to consider the two species identical and subangulata has priority.

Type locality: for subangulata , San Miguel Island, Calif. and for michaeli , Cayucos, Calif.

Collecting data: Cayucos,Calif.; San Simeon, Calif.; Monterey,Calif. (Burch); Dr. Keen reports the species taken at Moss Beach, San Mateo Co. by Vokes; Monterey Bay, at low tide to 15 fms. on rocks, rare. Also 3 mi. N. of Fort Ross, Mendocino Co.,one specimen (A.G. Smith); Cayucos and Pt. Reyes (H.N. Lowe).

Ocenebra barbarensis (Gabb),1866. British Columbia to the Santa Barbara Islands (Dall). Type locality, Catalina Island in 40 fms.

Figured in Bull. 112, pl.6, fig.5; pl.15, fig.11. It seems clear what this is and yet there has been a great deal of confusion about it. Many local collections have this confused with foveolata. The spiral sculpture differs and barbarensis is characterized by spines on the varices, a longer canal. At least this is my idea" (Burch). Mr. A.G. Smith advises as follows " There has been much confusion as to what this really is, as you point out. It is rather thin-textured, yellowish or light-brown in color generally, with a long spire and canal. Whorls ornamented with recurved, often tubular spines, sometimes with blunter varices, as in Bull. 112 figure, which is not typical barbarensis in my opinion. Willett has excellent figures of it in his Baldwin Hills paper (Trans. S.D. Soc. Nat. Hist. 8(30); pl.26, fig.3) although the varices may also be as indicated. We have never found it " in abundance" in Monterey Bay, where our experience indicates it to be rare in 10 fms. with specimens more often found in deeper water to 40 fms."

Collecting data: Dredged off Monterey, Calif. in 25 to 40 fms. (we failed to pick it up on the shallow water shale) ; off Redondo Beach, Calif. in 25 to 50 fms. (Burch); Catalina Island in 30 fms. and San Pedro in 15 fms. (G. Willett); Catalina Island in 30 fms. (Lowe)

Ocenebra epiphanea (Dall),1919. Venice,Redondo Beach,Catalina Island and San Pedro. Type locality, San Pedro, Calif.

Collecting data: off Redondo Beach in 25 fms. gravel bottom (Burch); [illegible]int Re [illegible] Calif ([illegible]we) " [illegible] specimen from off San Pedro is in the

...... Varices 20 or more
.... Spiral sculpture minute
20 mm. Santa Barbara to San Pedro .... squamulifera
Oldroyd, v.2, p.t2.,p.18.
..... Varices forming rounded nodes at the angle
...... Spiral sculpture of fine lines
.... Varices showing as low, rounded ribs
45 mm. Santa Barbara to Magdalena Bay .... poulsoni
Oldoyd, v.2, pt.2, p. 19
.... Varices prominent, plicate
16 mm. Puget Sound to Gulf of California..... michaeli
Oldroyd, v.2, pt.2, p.24.
.... Varices obsolete except at angle
Peru .... squamosa
Tryon 3-111
...... Spiral sculpture of squarish raised ridges
35 mm. Monterey to Magdalena Bay .... foveolata
Oldroyd, v.2, pt.2, p.32
...... Spiral sculpture of imbricated threads
25 mm. San Pedro to Catalina .... epiphanea
Oldroyd, v.2, pt.2, p.26
...... Spiral sculpture equalling axial
20 mm. Sitka to San Diego .... interfossa
Oldroyd, v.2, pt.2, p.21
..... Varices not spined or knobbed at the angle
...... Varices about 8
34 mm. San Quintin Bay .... turrita
Proc. USNM, v.56, p.336
...... Varices about 15
15 mm. Alaska to San Diego .... painei
Oldroyd, vol.2, pt.2, p.20
...... Varices very numerous
Ecuador to Peru .... buxea
Reeve, Murex, 33-170; Tryon, 3-166
.... Whorls not angulated
..... Varices frondose or spined
...... Varices with short fronds
9 mm. West Columbia .... exigua
Tryon, 2-125
...... Varices with squarish frondose points
20 mm. Gulf of California to Central America ... radicata
Reeve, Murex, 31-148; Tryon, 2-125-126
...... Varices with erect spines
30 mm. Gulf of California to Peru .... lappa
Reeve, Murex, 30-142; Tryon, 2-125-126
..... Varices scaly
...... Spiral sculpture absent
15 mm. Gulf of California .... peasei
Tryon, v.2, p.129
..... Varices lamellar
...... Spiral ribs strong
35 mm. Peru a nd Chile .... crassilabra
Reeve, Murex, 30-146; Tryon, 2-126

(con.)

Pt. Reyes, Calif. (Lowe); a single specimen of O. epiphanea from off San Pedro is in the Stanford collection (Keen).

Ocenebra tracheia (Dall),1919. Sitka, Alaska in 15 fms.

" O. tracheia (Dall) seemed to me to be distinctive when I studied the holotype. I noted the green color mentioned by Dall is due to algae " (Dr. A.M. Keen). Mr. A.G. Smith reports " Have a young specimen from 12 fms. off Del Monte that may be this species. Mac compared it with the type of tracheia and said it was close. Because the identification is not positive, we have not included it in our list from Monterey Bay. My specimen is undoubtedly different from either barbarensis or any other Ocenebra with which I am familiar."

Ocenebra japonica (Dunker),1860. Dunker: Mal. Blatt. v.6, p.230,1860. Moll. Japan, v.4, 1, fig.14.

This is an exotic species but has become well established and has developed into a major commercial pest in the oyster growing sections of the state of Washington and in British Columbia. It was introduced with seed oysters from Japan. Dr. Trevor Kincaid wrote a very interesting article on it which was published in the South Bend Journal. There are frequent references to it in the various fisheries reports of Canada.

It seems to be very doubtful if this species should be placed under Ocenebra, and in any event it should be separated subgenerically from the native west coast species. Mr. A.G. Smith comments also on this problem as follows " Think there may be a question whether this is really an Ocenebra (or Tritonalia) . Someone suggested Eupleura. Certainly it is not like any of the native West Coast Ocenebras. Full grown ones look very much like shortened Purpura foliata without the tooth."

Bellingham, Wash. (Lowe); Matsushima, Japan (Baker);

****

The following key to species and list of species from the entire west coast is adapted from Mr. A.M. Strong's notebook.

Whorls with 5 or more varices or axial ribs
. Outer lip without an anterior tooth
.. Canal more or less completely roofed over
...Shell fusiform, lip thickened and dentate .... Ocenebra (Tritonalia)

.... Whorls angulated
..... Varices spined at the angle
...... Varices 5-8
.... Varices with scale-like fronds
Ecuador .... dipsacus
Reeve, Murex, 26-111; Tryon, 2-110.
.... Varices winged, with a flat, hooked spine
Ecuador to Peru .... hamata
Reeve, Myrex, 27-119.
.... Varices with a long, guttered spine
30 mm. Panama .... diomedaea
Bull. Mus. Comp. Zool., v.43, p. 313
.... Varices with a short spine or angled knob
.... Spiral sculpture strong
20 mm. British Columbia to Catalina .... barbarensis
Oldroyd, v.2, pt.2, p.25
.... Spiral sculpture fine
20 mm Monterey to Santa Barbara .... subangulata
Oldroyd, c.2, pt.2, p.24

..... Varices reduced to rounded axial ribs
...... Axial ribs showing on all whorls
.... Body whorl with 14 tuberculate spiral cords
20 mm. Trinidad to Scammon's Lagoon ...... circumtexta
Oldroyd, v.2, pt.2, p.20.
.... Body whorl with 25 spiral cords
.... Axial ribs 10, low, rounded
30 mm. Washington to Venice .... sclera
Oldroyd, v.2, pt.2, p.23
.... Axial ribs 6 or 7, prominent
25 mm. Monterey to Catalina .... fusconotata
Oldroyd, vol.2, pt.2, p.19
...... Axial ribs showing on upper whorls only
.... Spiral sculpture of numerous fine grooves
15 mm. Alaska to Catalina .... lurida
Oldroyd, v.2, pt.2, p.16
.... Spiral sculpture of numerous ridges
15 mm. Monterey to Gulf of California ...... gracillima
Oldroyd, vol.2, pt.2, p.15

List of species of Ocenebra - Mr. Strong used Tritonalia Fleming.

O. barbarensis (Gabb),1866	British Columbia to Catalina
O. buxea (Broderip),1832.	Peru and Chile
O. carmen (Lowe),1935.	Gulf of California
O. circumtexta (Stearns),1871.	Trinidad to Scammons Lagoon
O. crassilabra (Gray),1829.	Peru and Chile
O. diomedaea (Dall),1908.	Panama
O. epiphanea (Dall),1919.	San Pedro and Catalina
O. exigua (Broderip),1832.	West Columbia
O. foveolata (Hinds),1844.	Monterey to Magdalena Bay.
O. fusconotata (Dall),1919.	Monterey to Catalina
O. gracillima (Stearns),1871.	Monterey to Gulf of California
O. hamata (Hinds),1843	Ecuador and Peru
O. horrida (Broderip),1832.	Panama to Chile
O. humilis (Broderip),1832.	Magdalena Bay to Ecuador
O. incisa (Broderip),1832.	Ecuador
O. interfossa (Carpenter),1864.	Alaska to San Diego
O. lappa (Broderip),1832.	Gulf of Calif. to Peru
O. lurida (Middendorff),1848.	Alaska to Catalina
O. michaeli Ford,1888.	Queen Charlotte Id. to Gulf of Calif.
O. painei (Dall)	Alaska to San Diego
O. parva (Smith),1877,	Gulf of Calif. to Galapagos
O. peasei (Tryon)	Gulf of California
O. perita (Hinds),1843.	West Mexico
O. poulsoni (Carpenter),1865.	Santa Barbara to Magdalena Bay
O. pumila (Broderip),1832.	Galapagos
O. radicata (Hinds),1843.	Gulf of Calif. to Central America
O. sclera (Dall),1919.	Washington to Venice
O. squamulifera (Carpenter) (Gabb)	Santa Barbara to San Pedro
O. subangulata (Stearns),1871.	Monterey to Santa Barbara
O. tortuosa (Broderip),1841.	Peru
O. turrita (Dall),1919.	San Quintin Bay
O. vittata (Broderip),1832.	Acapulco to Peru

Genus Urosalpinx Stimpson,1865. Type (by original designation), Fusus cinereus Say.

" Shell elongated oval, or short fusiform, longitudinally ribbed or undulated and spirally striated; aperture with a short canal; outer lip dentate and lirate within. Operculum somewhat like that of Purpura ; semicordate, with the nucleus at the outer edge a little below the middle.(Tryon).

Urosalpinx cinereus (Say),1822. San Francisco Bay and Elkhorn Slough, Monterey Bay.

This is an exotic species introduced from the Atlantic with seed oysters. It has long been established in San Francisco Bay but Mr. A.G. Smith reports that it is now found in Elkhorn Slough as well.

Collecting data: San Francisco Bay (Gripp); Alameda, Calif.(Gifford) .

Genus Eupleura H. & A. Adams,1853. Type (by subsequent designation Cossmann,1903), Eupleura caudata (Say).

Note key to species on page 38 of this paper.

" Shell with two opposite and continuous varices and smaller intermediate varices; aperture oval, anterior canal of moderate length, open."

Eupleura grippi Dall,1911. San Diego, Calif. in 15 fathoms.

Figured in Bull. 112, pl.5, fig.1. None of the members report having seen a specimen.

Mr. A.M. Strong comments " The figure and description is of a very different shell than the more southern shells placed in this genus. It may not belong here."

Genus Forreria Jousseaume,1880. Type (by original designation), Murex belcheri Hinds.

" Shell large, whorls six or seven, spinose on the shoulder; canal long and somewhat recurved; umbilicus wide and deep. Outer lip smooth, with a prominent spine or tooth, inner lip with a thin wash of callus." (I. Oldroyd, v.2, pt.2, p.49).

Subgenus Forreria s.s.

Forreria belcheri (Hinds),1843. Mugu Bay, Ventura Co. (Burch) to Scammon s Lagoon, L.C. Type locality, San Diego, Calif.

This comparatively common large species requires no discussion here other than a comparison with the species placed under the following subgenus Austrotrophon. Grant and Gale, p.727 state this well " ..In general aspect the shell recalls Forreria catalinensis (I.S. Oldroyd), but the thin, expanded varices of the latter are in belcheri closely welded to the sides of the whorl and the shell of Hinds is heavier,more quadrate in shape, and has a relatively shorter and more anterior canal and a more open umbilicus. The genus Forreria may be related to Trophon through such species, that is, via Austrotrophon."

Collecting data: Fine specimens of this species are comparatively common off Redondo Beach in 10 to 15 fms. We have never taken it in deeper water. This was on sandy bottom, not gravel. It is interesting to note that this is miles inshore and far different habitat than the deeper catalinensis. We have taken specimens of this species in most of the estuaries of southern California, Mugu,Anaheim,Newport, and common in the Estero below Ensenada, Mexico. It is obviously carnivorousand in the bays is often found near and oyster or clam bed. (Burch); Mission Bay (Lowe); under fish cannery, La Playa, Pt. Loma, San Diego Co. (Bristol); San Diego (Beckwith); Newport Calif. (Lowe); Todos Santos Bay (Orcutt);

Subgenus Austrotrophon Dall,1902 Type (by subsequent designation, Grant and Gale,1931), Trophon cerrosensis Dall.

" Shell of moderate size, with produced anterior canal, numerous lamellar varices which are prolonged into points or spines on the shoulder of the whorls; spiral sculpture absent or weak." (Grant and Gale).

Dr. Dall considered this group a subgenus of Trophon. However, Forreria has been generally accepted with generic standing.

Forreria catalinensis (Oldroyd),1927. Catalina Island, San Pedro and off Redondo Beach, Calif. (Burch). Type locality, off San Pedro in 25 fms.

This species was long confused with Trophon triangulatus Carpenter and is so misidentified in many collections at this time. Mrs. Oldroyd's diagnosis of the triangulatus matter (Oldroyd, vol.2, pt.2, p.29,1927) with the description of catalinensis has been generally accepted. We will discuss triangulatus Carpenter under Boreotrophon. It is a very different shell from this species.

" The type of F. catalinensis is 100 mm. in length, has seven sharp lamellar frills and no spiral sculpture." (Grant and Gale). " differs from belcheri in having a much narrower body whorl anteriorly, in lacking the constriction in the middle of the body whorl of that species, and in its more extended lamellae."

Collecting data: Dredged off Redondo Beach, Calif. in 75 fms., fine gravel and mud. It is only of passing interest that we took it in so much deeper water than the type came from. Furthermore, we have fine sets of the species from the late Mrs. Eshnaur stated to have been washed ashore on Terminal Island after storms. (Burch); Catalina Island in 30 fms. (Willett);

Forreria cerrosensis (Dall),1891. Redondo Beach, Calif. (Burch) to Cerros Island, L.C. Type locality, Cerros Island in 12 to 48 fms. mud and sand.

This species is closely related to F. catalinensis , but has about 10 lamellar frills per whorl instead of 6 or 7. Inasmuch as the original description of this species is not reprinted in Oldroyd we give it and the reference below for the convenience of members.

Wm. H. Dall, Proc. U.S.N.M., vol. 14, p. 181, pl. 5, figs. 5,7,1891.
" Shell of moderate size, thin, elongate, with seven whorls and eight to ten sharp, thin, elevated varices, each produced into a sharp,recurved, guttered spine at the shoulder; color, white to straw color, with blushes of warm brown; transverse sculpture of fine lines of growth; spiral sculpture of low, rounded bands, with narrower interspaces, which faintly crenulate the varices and outer lip; behind the shoulder these are absent; nucleus small, translucent, smooth, and polished, of one and a half whorls; subsequent whorls flattened behind the shoulder, slightly constricted at the base; canal rather long and wide, flexuous, with a marked fasciole; lip thin, pillar with a moderate whitish callus; throat white, without lirae; operculum dark brown, rather rounded. Longitude of shell, 38; maximum latitude, 25; maximum diameter of aperture, 9 millimetres.

This beautiful form most resembles the young of Chorus belcheri which is much more solid, with fewer varices, and strongly reticulately sculptured The figure of T. cerrosensis, given herewith, is turned so that the aperture is obliquely presented, so as to show the arch of the pillar; if it had been given in full front view the aperture would have seemed more rounded and wider.

This seems to belong to the same group as T. triangulatus , but is a much smaller and more delicate species. A marked characteristic is the difference of sculpture between the part of the whorl in front of and that

(con.)

behind the shoulder".

Collecting data: It should be noted that apparently the only difference between *catalinensis* and *cerrosensis* is the number of frills. And one with 6 or 7 and one with 8 to 10 with both being dredged from the same depth off Catalina Island and also Redondo Beach lead one to suspect that it is possible that a large enough series might show all stages of intergrades. If this should be true the name would be *cerrosensis* obviously. Dredged off Redondo Beach in 75 fms, associated with *catalinensis*. (Burch); Catalina Island in 35 fms. (G. Willett).

Genus *Trophon* Montfort,1810. Type (by original designation), *Trophon magellanicus* (Gmelin)-- *Buccinum geversianum* Pallas.

It has been our custom to place our species under *Trophon*. We have several sets of the genotype from Tierra del Fuego, and a comparison of these large coarse shells with comparatively huge body whorls and almost round apertures causes one to wonder why our west coast species were ever given this generic allocation. Certainly none of our species even bear a superficial resemblance to the genoyype of *Trophon*. Therefore, we propose to give generic standing to *Boreotrophon* and *Trophonopsis*. In arriving at this conclusion we have the advice of Dr. W.P. Woodring (Per. Comm. Huly,1945) " I prefer giving Boreotrophon generic rank", and a brief comment on this by Dr. A. Myra Keen " O.K. M. Keen". And on the next group Dr. Woodring also states " I prefer giving *Trophonopsis* generic rank."

Genus *Boreotrophon* Fischer,1884. Type (by monotypy), *Trophon clathratus* (Linnaeus).

" Shell somewhat fusiform, with long, slender anterior canal, axial ribs not developed into prominent lamellae and without long spines on the shoulder of the whorls; spiral sculpture absent or faint." (Grant & Gale).

Dr. Dall placed these species under subgenus *Neptunea* Roeding , genus Trophon.

Boreotrophon triangulatus (Carpenter),1864. Monterey, Calif. (Burch) to Catalina Island and San Pedro, Calif. Type locality, off Catalina Island in 60 fms. to San Diego, Calif. (Gripp).

As discussed under *Forreria* this species was long confused by Dall and others with the species *catalinensis* Oldroyd.

Collecting data: Monterey, Calif. in 20 fms. shale bottom.(Burch); Catalina Island in 30 fms. and San Pedro in 20 fms. (G. Willett); San Diego, Calif. in 50 fms. (Gripp); Catalina Island in 50 fms. (Lowe)

Boreotrophon albospinosus (Willett),1931. Nautilus , vol.45:65,67, pl.4, fig.3,1931. Catalina Island and Redondo Beach, Calif. Type locality, in 30 fm.s off Whites Landing, north side of Catalina Island.

Collecting data: This small species is not uncommon off Redondo Beach in the gravel beds in about 25 fms. We have also picked it up in about the same depth and habitat off Santa Monica, Calif. and off Point Vicente,Calif. (Burch); Catalina Island in 30 fms. (Lowe).

Inasmuch as this description is not in Oldroyd we reprint it here for the convenience of members.

" Similar to *Trophon triangulatus* Cpr. (Cal. Acad. Sci.3,1864,p.224), not of Dall (Bull. 112, U.S.N.M. 1921, p.109), but larger with proportionately greater diameter, longer spines and different color. In color similar to *T. macouni* Dall (Can. Dept. of Mines, G.S. Branch, Mem. No.14-N, p.12, pl.1,fig.7), but very different in shape from this species, being much wider proportionately, with shorter canal, more acute angles and longer spines and lacking the prominent spiral cords of *macouni*.

(con.)

The type, No. 1028 Collection of Los Angeles Museum, has six whorls, the apex being lost. The first two of these whorls are roundly rectangular at the shoulder, the last four very acutely angulated. Varices eight, sharply laminated, forming open, somewhat curved spines at the shoulder. The shoulder keel, between the spines is a poorly defined spiral cord. The type shows no other spirals, but two smaller specimens in the writors collection have an indication of another cord on the body whorl, about one third of the distance from the shoulder to the anterior extremity of the shell. Outer lip thin; canal short and open. Color of shell dark brownish purple; spines white; interior of aperture brown. The type, the largest specimen seen, measures as follows in millimeters. Length,21; diam. 14.4; last whorl 12. "

Boreotrophon dalli (Kobelt),1878. Arctic Ocean to Fuca Strait.
Type locality, Bering Strait.
Boreotrophon dalli alta(Dall)1902. Bering Sea.

to San Diego, Calif.
Boreotrophon scitulus (Dall),1891. Pribilof Islands to Unalaska Island, Bering Sea. Type locality, off Unalaska Island, Bering Sea in 225 fms.
Collecting data: Set in San Diego Museum from Bering Sea in 764 fms. (Albatross,1906); Point Loma, Calif. in 50 fms. (H.N. Lowe and also Dr. Fred Baker).

Boreotrophon disparilis (Dall),1891. Fuca Strait to San Diego (Kelsey, Dall identification). Type locality, off coast near Gray's Harbor,Wash. in 52 fathoms.

Boreotrophon rotundatus (Dall),1902. Off Pribilof Islands, Bering Sea.

Boreotrophon elegantulus (Dall),1907. Aleutian Islands, Alaska. Type locality, off Attu Island in 135 fms.

Boreotrophon beringi (Dall),1902. Icy Cape, Arctic Ocean to Puget Sound. Japan. (Dall). Type locality not known.
Collecting data: Punuk Island, Bering Sea in 5 fms. (Lewis)(Willett); Cook's Inlet, Alaska (Arnheim); Unalaska Island and Drier Bay, Knight Id Alaska (W.J. Eyerdam).

Boreotrophon cepulus (Sowerby),1880. Bering Sea and Aleutian Islands. Pleistocene of N. Japan at Volcano Bay (Dall). Type locality ?
Collecting data: Bering Sea (Lewis) (Willett).

Boreotrophon cymatus (Dall),1902. Pribilof Islands, Bering Sea.

Boreotrophon ithitomus (Dall),1919. Lynn Canal, Alaska. Type locality, in Taiya Inlet, S.E. Alaska in 253 fms.

Boreotrophon alaskanus (Dall),1902. Bering Sea N. of Unalaska in 225 fms .

Boreotrophon avalonensis (Dall),1902. Monterey, Calif. (Burch) to Catalina Island and San Diego, Calif. Type locality, off Avalon, Catalina Island in 80 fms.
Collecting data: Monterey, Calif. in 40 fms. (Burch); Catalina Island in 150 fms.and San Pedro Pleistocene (G. Willett); Catalina Island and San Pedro (Lowe); San Diego in 50 fms. and off Pt. Loma in 135 fms. (Baker)

Boreotrophon eucymatus (Dall),1902. Off San Diego, Calif. and Catalina Island. Type locality, off San Diego in 124 fms.
Collecting data: off Catalina Island in 75 fms. (G. Willett).

Boreotrophon bentleyi (Dall),1908. Redondo Beach (Burch) to San Diego, Calif. Type locality, San Diego harbor in 20 fms.

Collecting data: Not uncommon off Redondo Beach in about 75 fms. or deeper on mud bottom. (Burch); Catalina Island in 30 fms. (G. Willett); off Newport, Calif. (Lowe); San Diego in 60 fms. (Lowe).

Boreotrophon staphylinus (Dall),1919. Sitka, Alaska to the Coronado Islands Type locality, off Santa Barbara Island.

Boreotrophon calliceratus (Dall),1919. Monterey to San Diego, Calif. Type locality, off Point Loma, Calif. in 120 to 131 fms.

Boreotrophon pacificus (Dall),1902. Arctic Ocean southward, on the west to Kamchatka and on the east in deeper water to Acapulco,Mex. (Dall). Type locality ?

Collecting data: Nunivak and Punuk Islands, Bering Sea in 15 fms. (Lewis) (Willett); Frederick Sound, Alaska in 12 fms. (Lewis); Water-fall, Prince of Wales Island (Lowe); Izhut Bay, Afognak Island, 1922 under stones at extreme low tide and Drier Bay, Knight Island, Alaska-about a dozen specimens on herring pound seine. (W.J. Eyerdam).

Boreotrophon multicostatus (Eschscholtz),1829. Nunivak Island, Bering Sea to San Pedro, Calif. Also northern Japan. (Dall). Type locality, Sitka, Alaska.

Collecting data: Kodiak Island, Sitka, and Forrester Island, Alaska--low tides (G. Willett); Victoria, B.C. (Lewis); Kodiak Island specimens are very large (G. Willett); Alert Bay, B.C. (Lowe); Japan (Baker); Bear Bay, Peril Strait, Alaska (Baker); Orcas Island, Puget Sound in 10-30 fms. (Baker); Izhut Bay, Afognak Island, and Drier Bay, Knight Island, Alaska- dredged (W.J. Eyerdam).

Boreotrophon peregrinus (Dall),1902. Catalina Island in 16 fathoms.

Collecting data: We have a note to the effect that this species is in the synonymy of triangulatus Carpenter.

Boreotrophon macouni (Dall),1910. Port Althorp, Alaska to Barkley Sound, B.C. Type locality, the ship canal,Barkeley Snd.,Vancouver Id., B.C.

Boreotrophon orpheus (Gould),1849. Forrester Island, Alaska (Willett) to Redondo Beach, Calif. and Catalina Island. Type locality, Puget Snd.

Collecting data: Dredged in 50 and 75 fms. off Redondo Beach.(Burch); off San Juan Islands, Wash. (T. Kincaid); Craig, Alaska in 30 fms. and Catalina Island, Calif. in 80 fms. (G. Willett); Victoria, B.C. in 12 fms (Lewis); Kodiak Island, Alaska (Orcutt); Puget Sound (Lowe); Victoria, B.C. (W.J. Eyerdam).

Boreotrophon smithi (Dall),1902. Pribilof Islands, Bering Sea to Santa Barbara Islands, Calif. (Dall). Type locality ?

Mr. George Willett reports taking this form at Ketchikan,Alaska in 30 fms.and states that it equals stuarti, the following species.

Boreotrophon stuarti (E.A. Smith),1880. Shumagin Islands, Alaska to San Diego, Calif. Type locality, Vancouver Island, B.C.

Collecting data: S.E. Alaska- general- low tide to 25 fms.(Willett); Prince Wm. Sound in 18 fms. (Lewis); Craig, Alaska in 25 fms. (Lowe); Strait of Fuca,Wash. and Sawmill Bay, Pr. Wm. Sound, Alaska- dredged (Eyer-dam).

Genus Trophonopsis Bucquoy,Dautzenberg, and Dollfus,1882. Type (by original designation), Murex muricatus Montagu.

" Shell like that of Boreotrophon but with prominent spiral sculpture and secondary axial sculpture" (Grant and Gale, p. 725).

Trophonopsis cerritensis (Arnold),1903. Dr. Dall in Bulletin 112 lists this species " Cerritos and San Pedro. Pleistocene. " Grant and Gale state that the figure in Arnold looks like a Boreotrophon and so place it. However, there seem to be no Recent records of it and we propose to drop it from our list of the Recent fauna.

Trophonopsis pedroanus (Arnold),1903. This species was described from the Pleistocene of Deadman's Island. There are apparently no Recent records of it. Therefore we propose to drop it from the list of our Recent fauna along with the preceeding species. There is also with this species the question of its generic allocation. Grant and Gale make it a subspecies of orpheus under Boreotrophon.

Trophonopsis lasius (Dall),1919. Southeastern Bering Sea to Todos Santos Bay, L.C. Type locality, off Pt. Pinos, Calif. in 495 fathoms. We are placing all records of the species tenuisculptus Carpenter,1866 to this species. The reference is to an article by Mr. George Willett in the Nautilus 52:10,11 in which Mr. Willett shows that Carpenters species from the Santa Barbara Pliocene is really an Ocenebra,(Tritonalia). The species long identified as Trophon tenuisculptus would therefore be without a name were it not for the fact that it is identical with lasius.

Collecting data: Off Redondo Beach, Calif. in 50 fms. rock and gravel bottom (Burch); Forrester Island, Alaska; S.E. Alaska- low tide to 30 fms. (Willett); Catalina Island in 25 to 60 fms. (G. Willett); Puget Sound (T. Kincaid); south end of San Clemente Island in 40 fms. (Dr. Fred Baker); Bear Bay, Peril Strait, Alaska (Stephens); Catalina Island in 35 and 50 fms. (Lowe); San Juan Islands, Puget Sound (Lowe); False Narrows, B.C. (Oldroyd); Izhut Bay, Afognak Island and Drier Bay, Knight Island, Alaska- dreged (W.J. Eyerdam).

Trophonopsis apolyonis (Dall),1919. Off Santa Barbara Islands, Calif. in 216 to 339 fms.

Trophonopsis kamchatkanus (Dall),1902. Western Bering Sea in 100 fms. Type locality, USFC Sta. 3644, southeast of Kamchatka. Figured in Bull. 112, pl.10, fig.7.

Trophonopsis tripherus (Dall),1902. Fuca Strait to San Diego, Calif. and off Piedras Blancas, Lower Calif. in 485 fathoms (Dall). Type locality, U.S.S. Albatross Sta. 3343, off Destruction Island, Wash. Figured in Bull. 112, pl.15, figs. 8,9.

The figures of this species remind one of Boreotrophon.

Collecting data: Catalina Island in 50 fms. (Willett).

Trophonopsis tolomius (Dall),1919. San Miguel Island, Calif. in 376 fms.

Trophonopsis keepi (Strong and Hertlein),1937. Proc. Calif. Acad. Sci. 4th Ser., vol.22, no.6, p.170, pl.35, fig.8. Known only from the type dredged in 30 to 50 fathoms off the west end of San Nicolar Island, Calif.

Inasmuch as this is not in Oldroyd we reprint the original description for convenience.

" Shell thin, delicate, white; nuclear whorls two, smooth,rounded tilted; subsequent sculptured whorls seven, with strongly tabulated shoulders; axial sculpture of twelve sharp varices, sharply angulated and more or less spinose at the shoulder, continuous over the entire whorl and extending to the canal, where they become lower and closely crowded; spiral sculpture of close, microscopic striations; outer lip thin, angulated at the shoulder of the whorl; body and columella with a coat of white enamel; canal long, slightly twisted and strongly recurved. The type measures: length, 26.9 mm., length of aperture and canal, 14.5 mm., maximum diameter, including varices, 10 mm."

" In outline the single type specimen resembles that of Trophon tripherus Dall, said to range from the Straits of Juan de Fuca to off Piedras Blancas, Lower Calif. It differs in the much stronger development of the varices and the lack of the spiral cords. "

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*** Note- The editor has placed the last two species in Trophonopsis without having seen either species or having been advised by the authors. Dr. Dall placed tripherus here no doubt because of the spiral cords. The figures of both species indicate that they must be very close to the species we label bentleyi Dall. This would indicate that they might be more properly allocated to Boreotrophon. If this should prove to be the case it will be stated in our Additions and Corrections.

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The following key to species and list from Mr. A.M. Strong's notebook will be of interest. Mr. Strong lists them under Trophon.

Whorls with 5 or more varices or axial ribs
. Outer lip without an anterior tooth
.. Canal wide, open, outer lip thin .... Trophon
... Whorls coronated with long, guttered spines
.... Varices narrow
..... Varices about 7, interspaces smooth
100 mm. Catalina and San Pedro .... .catalinensis
Oldroyd, v.2, pt.2, p.27.
..... Varices about 10, interspaces spirally threaded
40 mm. Cerros Island .... cerrosensis
Proc. USNM, v. 24, p. 549
.... Varices expanded , 7 to 10
80 mm. Magdalena Bay .... pinnatus
Proc. USNM, 24, p.549; Proc. USNM, 68, pl.32, fig.5
... Whorls coronated with short spines or angular points
.... Varices 5 to 9
..... Varices narrow
...... Spiral sculpture absent
.... Varices bearing open, radiating spines
8 mm. Catalina .... triangulatus
Oldroyd , v.2, pt.2, p.29
.... Varices bearing small, erect spines
21 mm. Sitka to Coronado Islands .... staphylinus
Oldroyd, v.2, pt.2, p.36
.... Varices bearing recurved spines
14.5 mm. San Diego .... bentleyi
Oldroyd v.2, pt.2, p. 35
...... Spiral sculpture of fine striae
.... Whorls excavated above the shoulder
23 mm. Catalina .... peregrinus
Oldroyd, v.2, pt.2, p. 36

.... Whorls slopingly shouldered
.... Varices bearing radiating spines
16.5 mm. Catalina to San Diego .... avalonensis
Oldroyd, v.2, pt.2, p.24
.... Varices bearing nearly vertical spines
16 mm. Monterey to San Diego .... calliceratus
Oldroyd, v.2, pt.2, p. 36
..... Varices, wide, thin, lamellar
...... Spiral sculpture absent
47 mm. Bering Sea to Santa Barbara .... smithi
Oldroyd, v.2, pt.2, p.38
...... Spiral sculpture present
53 mm. Alaska to San Diego .... stuarti
Oldroyd, v.2, pt.2, p.38
.... Varices 10
..... Spiral sculpture of 6 to 8 flat ridges
San Ignacio Lagoon to Chile .... horridus
Reeve, Murex, pl.28, fig. 128; Tryon, v.2, p. 146
..... Spiral sculpture of prominent sharp ridges
Galapagos to Chile...................... peruvianus
= xanthostoma (Reeve, Purpura 5-24; Tryon 2-146
.... Varices 12 or more
..... Spiral sculpture absent
10.5 mm. Bering Sea to San Diego .... multicostata
Oldroyd, v.2, pt.2, p. 33
..... Spiral sculpture of 3 feeble threads
22.5 mm. Puget Sound to Lower Calif. ...... tripherus
Oldroyd, v.2, pt.2, p. 40
... Whorls not coronated
.... Spiral sculpture absent
..... Varices 13 to 15
21 mm. Santa Barbara Islands .... apolyonis
Oldroyd, v.2, pt.2, p.40
..... Varices 15 to 20
...... Whorls rounded
25 mm. Arctic Ocean to Acapulco .... pacificus
Oldroyd, v.2, pt.2, p. 35
...... Whorls angularly shouldered
26 mm. San Diego .... eucymatus
Oldroyd, v.2, pt.2, p.35
..... Varices about 35
19 mm. San Miguel Island .... tolomius
Oldroyd, v.2, pt.2, p. 41
.... Spiral sculpture present
..... Spiral carina on the periphery of the body whorl
10 mm. Gulf of California .... mazatlanicus
Proc. USNM, vol.24, p.246
..... Spiral sculpture of several equal ridged
Bering Sea to Todos Santos Bay .... lasius(tenuisculptus,)
Oldroyd, v.2, pt.2, p. 39

List of Species

Subgenus Austrotrophon Dall, 1903.

Austrotrophon catalinensis Oldroyd 1927	San Pedro and Catalina
Austrotrophon cerrosensis Dall, 1891	Cerros Island
Austrotrophon pinnatus Dall	Magdalena Bay and Pt. Abreojos

(con.)

Subgenus Boreotrophon Fischer,1884

Boreotrophon albospinosus Willett	Catalina Island
Boreotrophon apolyonis Dall,1919	Santa Barbara Islands
Boreotrophon avalonensis Dall,1902	Catalina to San Diego
Boreotrophon bentleyi Dall,1908	San Diego
Boreotrophon calliceratus Dall,1919	Monterey to San Diego
Boreotrophon citricus Dall	Easter Island
Boreotrophon diazi Durham	Gulf of California
Boreotrophon eucymatus Dall	San Diego
Boreotrophon keepi Strong and Hertlein, 1937	San Nicolas Island
Boreotrophon laciniatus Martyn	Chile
Boreotrophon lorenzoensis Durham,1942	Gulf of California
Boreotrophon mazatlanicus Dall	Mazatlan
Boreotrophon multicostatus Eschscholtz,1829	Bering Sea to San Diego
Boreotrophon pacificus Dall,1902.	Arctic to Acapulco
Boreotrophon panamensis Dall,1902.	Bay of Panama
Boreotrophon peregrinus Dall,1902	Catalina Island
Boreotrophon peruviana Lesson,1830	Galapagos to Chile
Boreotrophon smithi Dall,1902	Bering Sea to Santa Barbara
Boreotrophon staphylinus Dall,1919	Sitka to Coronado Islands
Boreotrophon stuarti E.A. Smith,1880	Alaska to San Diego
Boreotrophon lasius Dall (tenuisculptus Carpenter)	Bering Sea to Todos Santos Bay
Boreotrophon tolomius Dall,1919	San Miguel Island
Boreotrophon triangulatus Carpenter	Catalina and San Pedro
Boreotrophon tripherus Dall,1902	Juan de Fuca to San Diego

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* Note- We plan to complete our report on the Thaisidae in our next issue.

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Additions and Corrections

Buccinum striatissimum Sowerby,1899. Ann. Mag. N. Hist., ser. vii, vol. iv,p.370,fig.1,Nov. 1899. Type locality, Japan.

This species is to be added to our faunal list. The following note has been received from Dr. A. Myra Keen " In the Stanford collection there are specimens from 937 fathoms off Pribiloff Islands and one large adult from Lynn Canal (lat. 58), Alaska, collected by Dr. Harold Heath. "

When available we will reprint the original description for the convenience of members. Dr. W.H. Dall, Smithsonian Misc. Coll., vol.50, pt.2,No. 1727, p.140 discusses the species as follows (1907) " This fine species is rather abundant in the dredgings, having been obtained on the south coast of Yesso, Tsugaru Strait, the Sea of Japan, and the southwest coast of Korea in from 50 to 568 fathoms. Until the series was compared I was inclined to suspect that this species was identical with the following one (B. bayani Jouss.), but a study of the series leads me to conclude that, though extremely similar in surface characters and general appearance, the present species can always be distinguished by its rounder whorls and more deeply constricted sutures. It reaches a length of some 120 and a diameter of 65 mm."

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The following collecting records were received from Mr. W.J. Eyerdam after the stencils were cut for this issue.

Nassarius fossatus (Gould),1849. San Juan Id.-dredged

Nassarius mendicus (Gould),1849. Port Orchard, Kitsap Co., Rosario Beach, Skagit Co., Alki Pt., Seattle, King Co., San Juan Id.,San Juan Co. Wash., Drier Bay and Thum Bay, Knight Id., Pr. Wm. Snd., Izhut Bay, Afognak Id. and Sitkalidak Id.,Alaska . Found under stones - common in

(con.)

Puget Sound and some parts of Alaska but generally scarce in Alaska.

Nassarius perpinguis (Hinds),1844. San Juan Id., Wash.- dredged- Note- I have never found it on the beaches in Puget Sound and it is also scarce in dredgings.

Mitrella gausapata (Gould),1850. Alki Pt., Seattle, King Co., Port Orchard, Kitsap Co., Rosario Beach, Skagit Co., Wash. and Drier Bay, Knight Id., Prince Wm. Snd., Alaska. It is generally to be found on eel grass or algae. * Extended range-*- about 700 miles N. from Forrester Island. Note- I have always found only M. gausapata in the north, so it should not be treated as a synonym of carinata, but retained at least as a sub-species or even a distinct species.

Mitrella tuberosa (Carpenter),1865. Drier Bay, Knight Id., Pr. Wm. Snd . Alaska- dreged- * Extended range northward from Forrestor Island about 700 miles.

Mitrella rosacea (Gould),1840. Unalaska, Aleutian Ids., 1932

Mitrella permodesta (Dall),1890. Unalaska, Aleutian Islands,1932.

Mitrella gouldii (Carpenter),1867. Izhut Bay, Afognak Id. , Alaska,1922

Amphissa columbiana Dall,1916. Puget Sound, Wash., Izhut Bay,Afognak Id. Knight Id., Pr. Wm. Snd., Sitkalidak Id. and Raspberry Id.,Alaska. My experience has been that I have difficulty in separating this species from versicolor as some of the colonies of columbianus are not only color-ed like versicolor but match them in average size.

Amphissa reticulata Dall,1916. Puget Sound, Wash.

Amphissa versicolor Dall,1871. Sitkalidak Id. and Izhut Bay, Afognak Island, Alaska.

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The following data was received from Mr. A.G. Smith after the stencils were cut.

Fusinus- " Since writing this I have one more comment on Fusinus, which is that the type of F. kobelti Dall came from Catalina, as indicated in the explanation to his figure in the Proceedings of the USNM. This leaves the Monterey species open for a new name, which, for the time being, I am continuing to call monksae for label purposes, as it is the living descendent of this species."

Ptychatractus californicus Dall- 36-51 fathoms off Pt. Pinos, in soft dark gray mud; one young specimen (USFC Sta. 4464).

Macron lividus (A. Adams)- Reports of this from Monterey are based on a lot, so labelled, in the National Museum. I doubt its occurance there and also question the Farallone Ids. record.

Mohnia vernalis Dall- Off the mouth of Salinas River in 581 fms. in green mud and sand; rare.

Exilioidea rectirostris (Carpenter)- Use this genus name rather than Exilia following Grant and Gale, and think it belongs in the family where Dall left it. It certainly doesn't belong in the Fusinidae, at all, in my opinion. 389-456 fms. off Pt. Pinos; rare. Also dredged off the Mendocino Co. coast.

Exilioidea kelseyi (Dall)- About 100 fms. off La Jolla; one specimen.

* Note- Of course, there is always the possibility of creating a new family Exilioidiadae to take care of the above two species, as there is so much doubt as to just where they do belong.

Plicifusus griseus Dall- 381-633 fms. off Pt. Pinos; scarce

Colus aphelus (Dall)- 750-766 fms. off Pt. Pinos; one specimen

Colus clementinus Dall- 627 fms. off Pt. Pinos; rare.

Colus georgianus Dall- 750-766 fms. off Pt. Pinos; rare

Colus halidonus Dall- 331-633 fms. off Pt. Pinos; rare

Colus jordani (Dall)- 633 fms. in Monterey Bay

Colus severinus (Dall)- 278 fms. off mouth of Salinas River; 296 fms. off Pt. Ano Nuevo; scarce

(con)

Colus trophius (Dall)- 750-766 fms. off Pt. Pinos; rare

Neptunea tabulata (Baird)- 50-80 fms. off Moss Landing, Monterey Bay. 202 fms. off Watsonville Beach. Taken by set line fishermen 200 fms. off Davenport, Santa Cruz Co. Scarce, in the Bay.

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We are indebted to J.R. le B. Tomlin, 23 Boscobel Rd., St. Leonards-on-Sea, England for the following advice on one of our questions brought up in Munutes #48.

" I enclose a note referring to the queries in your Minutes #48, p.3 re Bulla quoyii Gray. Dieffenbach's Travels is a rare book over here- his name is misspelt and the date wrongly given on your p.3. I hope that the complete citation which I give will help to clear up quoyii, though it has already been accurately given by Pilsbry in the Manual.

The fact that it is unreservedly accepted by Suter in his big N.Z. Manual ought to be sufficient to excise the name entirely from any Californian connection.

Dieffenbach's book was called " Travels in New Zealand, with contributions to the geography, geology, botany and natural history of that country" by Dr. E. Dieffenbach, 2 vols., 1843.

In vol. II, pp 177-296 are headed " Fauna of New Zealand" and "Notes on the materials at present existing towards a Fauna of N.Z. by John Edward Gray, F.R.S., keeper of the zoological collections in the British Museum". Pages 228-263 are headed " Shells" and " Catalogue of the species of Mollusca and their shells which have hitherto been recorded as found at New Zealand, with the description of some lately discovered species by J.E. Gray".

On p. 243 is the following item:- " Fam. Bullidae. no.113. Bulla quoyii Gray, n.s. Bulla striata Quoy et Gaim. Voy. Astrol.ii,354, t.26, f.8,9. Inhabits New Zealand, Quoy. Stanger.

Shell ovate, smooth, marbled with purplish-grey and white dots; spire perforated. Like Bulla striata Lam. but quite distinct."

From this I take it that one must regard Bulla quoyii Gray as a substitute name for, and a synonym of B. striata Q. & G. This is all correctly stated by Pilsbry in the Manual XV,348. I do not think it is correct to speak of quoyii as of " Gray MS" as you do in #48, p.3: a considerable part of the 2nd vol. of the " Travels" was written by Gray and published as by Gray.

Suter in his excellent " Manual of N.Z. Mollusca" accepts quoyii Gray as endemic, with localities Bay of Islands and Auckland Harbour. It was Carpenter and Arthur Adams who went wrong."

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Dr. W.R. Coe, Scripps Institution of Oceanography, La Jolla, Calif.

Dr. Coe advises that the holotype and several pratypes of the Mytilus edulis diegensis Coe have been sent to the U.S. National Museum.

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Dr . A. Myra Keen of Stanford University has sent us the following note.

" Two new Opinions of the International Commission on Zoological Nomenclature will be of interest to malacologists:

Opinion 160, entitled, " On the status of the names Anguina Scopoli,1777 Anguillulina Gervais van Beneden,1859" ... etc. Issued April,1945,price four shillings. The summary says, " For so long as generic names published by authors using a binary, though not a binomial, system of nomenclature are recognized as complying with the requirements of Article 25 of the International Code, the generic names published by Scopoli in 1777 in his Introductio ad Historian Naturalem are to be accepted as available nomenclatorially, but the position will need to be reexamined if later it is decided to reject generic names published by authors not applying the binomial system"

(con.)

MINUTES OF THE CONCHOLOGICAL CLUB OF SOUTHERN CALIFORNIA
September 1945

These papers are published by a group of interested students for our own pleasure and financed by voluntary contributions of members and friends. It is not our intention to offer subscriptions and guarantee regular periodical publication. However, non-members of our club will be placed on our mailing list and receive all papers published for contributions to our fund of $2.50 per year or $1.25 each six months.

Our next meeting will be held October 7, at the Los Angeles Museum, Exposition Park, Los Angeles, Calif. at 2:30 P.M. All interested persons are welcome.
We are now meeting the first Sunday of each month.

Please mail all news about shells, shell publications, shell collectors, shell trips, localities etc. to your editor,

John Q. Burch,
4206 Halldale Ave.,
Los Angeles 37, Calif.

****

We still have on hand a few copies of our bound Distributional List, Part I, Pelecypoda, for which we are asking $5.00 to our fund.

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Trevor Kincaid, State of Washington, Department of Fisheries, Oyster Laboratory, Ocean Park, Washington.
Professor Kincaid recently sent us two lots of shells from Ocean Park, Wash. and both sets are of considerable interest. Both seem to be extensions of the ranges recently published.
First- " One of the oystermen brought me a handful of gastropods several days ago which are new to me. As I am out of touch with the literature I am sending you a few specimens for examination. It seems to be a Nassa but does not agree with the species of this genus that I have encountered in Puget Sound. You can probably spot it at once."
Note-* - The shells sent are the species we discussed in Min.#51,p.9- Nassarius (Ilynassa) obsoletus (Say),1822. This species was introduced from the Atlantic into San Francisco Bay presumably with seed oysters and has become quite common, but this is the only other record we have from this coast and it is interesting to find it established in the state of Washington.
Second- " I am sending you another mollusk that is unknown to me as a native of this region. It is a snail which is devastating gardens in this vicinity. I hardly think it is native to this territory. You are straightening out a lot of moot points and heading up a lot of others for a solution. More power to your elbow."
Note-*- This is the species discussed and figured by Dr. Pilsbry in his new " Land Mollusca of North America" on pp 4,5, none other than our common garden pest Helix aspersa Muller,1774. Every seed store in southern California put up window displays of Snairol or other controls for this pest. However, I note that Dr. Pilsbry does not list it from the state of Washington so assume that this is also an extension of range. The species was originallt introduced from Europe.

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Glenn R. Webb, Ohio, Illinois. The following letter was the first we had heard of Glenn's return. " Since my recent release from military service, I have been busy digging out the specimens I sent back from overseas. So far none seem to have survived despite attempts to coax them into activity .

One bright spot amid the odor of dried-in-snail and dust was a year old package of Otala lactea Muller sent from Texas by Mrs. Sebesta last June. Of the 51 specimens 66.7% have survived their approximetal 13 months of aestivation. Probably the survivors can be successfully fattened up for anatomical purposes. My main objective at the moment is the assemblage of as great a variety of captive specimens and species as possible to allow the resumption of studies interrupted by military duties, as well as prepare fo for entertainment for the coming winter. Perhaps some of the club members would care to exchange live specimens of their local slugs and snails for shells and radular material of English,French, and Indiana-Illinois material. With my complete recovery, I hope to make several short collecting trips about the country; but that won't be for awhile yet. Thanks for sending me copies of the Club Minutes during my absence."

L.M. Wright, CEM, U.S. Navy - A.B.S.T.C.-A 9 Camp Peary, Williamsburg, Va. Mr. Wright complained of not receiving a copy or so of our paper, but the reason for that was simply that the Navy will not forward second class mail and we were notified that they were not forwarding it. Wright says " ... Although as you can see I am stationed temporarily in Virginia, I would like all Minutes and correspondence addressed to my home Enterprise, Florida (no street necessary- very small town). Mrs. Wright will forward my mail. Will appreciate suggestions as to indexing the Minutes. I have in mind a loose leaf indexed memo book which would show families,genera,subgenera & species and these for classifications further subdivided by symbols as D- description, M- mention, F- figure, followed by the page number of course, and the Minutes number bracketed after the page number. Thus I believe a living file can be built up and kept going. I expect to bind the Minutes ib vols. #50 concluding vol.I. Guess I'll have to write a preface. Have been unable to collect any interesting living shells since leaving Miami but the Miocene fossils are interesting to me and I very recently sent my dear friend Mrs. Kate Stephens an assortment."

* Note* Upon the conclusion of our coverage of the fauna of this coast we plan to publish a complete check list with references to the Minutes in which they are discussed. Everyone can work out an indexing system of their own and any plan will work if kept to date. I started out with 3 x 5 cards and made a card for every reference I found to California species. The only trouble with this is that I am now working with exactly 29 drawers full of cards.

Mr. W.P. Cook,2966 Union Ave., San Diego 1 has been ill and we are pleased to hear in a letter from Mrs. Joshua L. Baily Jr. that Mr. Cook is much improved. We were honored to have as our guests last week Dr. and Mrs. Baily.

Albert Bauman, 6136 Lexington Ave., Los Angeles 38, Calif. Our member dropped in for a visit last week and spent the evening. He was in the uniform of the U.S. Army wearing an interesting display of service ribbons and stars. Our collection was enlarged by the addition of quite a number of land shells from Germany and Europe. Bauman had one very interesting lot of showy tropical marine shells which he collected in Germany. The interesting thing about them was that he collected them in the street near the spot where a German museum had been just before a bomb hit it. He was expecting to be shipped direct to the Japanese war, but that was several days before the peace news and it is possible that his plans may have been changed.

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The Bulletin for June, of the Natural History Museum of San Diego is at hand. One interesting note that might give an idea to some of our members was an account of several rare finds in the way of fossil mollusks in the excavations or cuts exposed by new construction projects. One lot of Pliocene material was stated by Dr. Hertlein of the California Academy to be new species. Dr. U.S. Grant IV has resigned as a director and Dr. Carl L. Hubbs was elected in his place.

Family THAISIDAE

Genus *Thais* Roeding,1798. Type (by subsequent designation, Dall,1909) *Thais neritoides* (Lamarck)- *Murex fucus* Gmelin

" Shell stout, spire low, aperture large, columella flattened, anterior canal very short; sculpture predominantly spiral ,modified into scales nodes or even spines , axial sculpture absent or of lamellar irregularities"

Subgenus *Nucella* Roeding,1798. Type (by subsequent designation, Dall 1909), *Nucella lapillus* Linnaeus.

" Shell usually with a higher spire than typical *Thais* , and with spiral and axial sculpture both present, the latter sometimes well developed, or with both spiral and axial sculpture obsolete or nearly so."

Typical *Thais* has an anal notch in the aperture which is entirely lacking in *Nucella.* " (Grant and Gale, p. 716)

Dr. Dall in Proc. U.S.N.M. vol.49, 1915 gives a fine discussion of this group.

Thais lamellosa (Gmelin),1792. Port Clarence, Bering Strait and southward on the west to Sado Island,Japan Sea, on the east to the Aleutian Islands and Santa Barbara, Calif. Pliocene and Pleistocene of California and Oregon (Dall,1921). " The type locality for *T. lamellosa* is Cook's Strait, New Zealand" (Dr. A.M. Keen).

" This exceedingly variable species has been thoroughly overnamed. In the Oldroyd collection at Stanford University there is a series of specimens showing all intermediate steps from smooth forms to those with strong axial frills and from small, low spired individuals to large, high-spired individuals. This species affords a classic example of individual variation. The varietal names proposed by Dall (1915) have absolutely no systematic value" (Grant and Gale,1931, p.717).

Therefore, Grant and Gale place all of the varieties in the synonymy of the typical. The consensus of opinion is that it is but one species but some hesitate to state that some of these subspecies such as *franciscana* may not have some value as an ecologic form. Mr. W.J. Eyerdam writes as follows " I have about 1000 specimens of this exceedingly variable species. Several of these variations are entitled to names and the slender shells that are in the Prince Wm. Sound area might be described as a separate race. I can submit plenty of specimens from Knight Island to anyone desiring them for study. Professor Trevor Kincaid has a series of over 30,000 specimens of catalogued *T. lamellosa* and *T. emarginata* and photos and figures of a great many varieties and phases. Eventually it is hoped that this monograph will show all possible variations as well as habitats of these seemingly endless changes of form, color and size. *Thais lapillus* of both sides of the Atlantic and the shores of the Arctic is a near counterpart of *T. lamellosa.* Do these two species overlap somewhere in the Canadian Arctic ! I believe that Dall's varieties should stand, especially if they are distinct forms and a few others should also be named. This would help collectors recognize them more readily. A conchologist can easily recognize nearly all phases of *T. lamellosa* as belonging to a single species, but there are so many well defined varieties and the range of extremes is so great that it would simplify matters considerably to pin down all the outstanding races and varieties with a few more names."

However, the majority opinion is to follow Grant and Gale and place all of the varieties in the synonymy of the typical.

Collecting data: Port Orchard, Wash. (frilled and colored); Alki Point, Seattle, Wash.; De Poe Bay, Oregon; Crescent City, Calif. (high spired, no frills); San Francisco Bay (smooth) (Burch); " Not recorded from Monterey Bay or the Monterey peninsula, but reported by the Turvers to be common on the beach at the mouth of Scott Creek, 15 miles north of Santa Cruz. This may be the farthest south authentic record. I doubt if it lives as far south as Santa Barbara. If you throw out Dall's subspecies, I think you should also include *franciscana*." (A.G. Smith).

Mr. George Willett made the following penciled note following the list of species of *T. lamellosa*, and *emarginata* " We could continue naming varieties of *Thais* almost indefinitely. Although you list only one of *T. lima* there are numerous variants of this species that warrant names as much as those named in other species. I doubt that any of the named forms are true geographic races, and I would favor dropping all subspecific names in the group".

Therefore we will simply list the subspecies below. It is our opinion also that they are of no systematic importance.

Thais lamellosa franciscana Dall,1915.	San Francisco Bay.
Thais lamellosa hormica Dall,1915.	Inner Harbor at Sitka,Alaska
Thais lamellosa neptunea Dall,1915.	Cook's Inlet, Alaska
Thais lamellosa cymica Dall,1915.	Surf beaten rocks, off coast of Washington.
Thais lamellosa sitkana Dall,1915.	Inner Harbor, Sitka, Alaska.

Thais lima (Martyn),1784. Dr. A.M. Keen advises " The type locality for *T. lima* is King George's Sound, New Zealand. If Martyn's names are rejected *T. lima* may be credited to Gmelin,1790. Range: Kotzebue Sound, Arctic Ocean, south on the west to Bering Island, the Kuril Islands and northern Japan, on the east to the Aleutians, Monterey, and San Diego, Calif. and Cerros Island, Lower Calif. (Dall).

Collecting data: Port Orchard, Puget Sound; De Poe Bay, Oregon and Port Orford; Crescent City, Calif. (Burch); " We doubt the Monterey records of this species, and also the one from San Diego (A.G. Smith); Nunivak Island, and Pavloff B. (Lewis) (G. Willett); Mouth of Smith River,Calif. (Chace); Cape Perpetua,Oregon (Trethewey); Sitka, Alaska (Lowe); Puget Sound and Prince Wm. Sound and Kodiak Islands, Aleutian Islands, Alaska Penninsula and Kamchatka- coll by W.J. Eyerdam who makes the following comment " There are at least tyree distinct races showing but little variation between themselves. The Alaska penninsula and Aleutian variety at least as far as Atka Id. in the middle of the chain is a littoral race while the one I collected in Kamchatka in the Gulf of Kronotski is a heavy large form from sunken reefs below low tide with uniform shape." See Mr. Willett's note under previous species.

Thais canaliculata (Duclos),1832. The whole Aleutian chain, eastward to Sitka and southward to Monterey, Calif. (Dall) to Cayucos,Calif. (Burch). Type locality, California.

Collecting data: Port Orchard, Wash.; De Poe Bay and Port Orford,Oregon; Crescent City,Calif.; under Mytilus at Cypress Point, Monterey Co.,Calif. (Burch); nice set from Ketchikan,Alaska collected by Mr. G. Willett that are orange banded (Burch); " Typical *canaliculata* definitely does not extend down as far as Monterey and I have not seen specimens from the Mendocino coast. All Monterey records of this are for the subspecies *compressa*." (A.G. Smith); Puget Sound, Wash. and Afognak Id. and Shuyak Strait, Alaska showing several color phases collected by W.J. Eyerdam who makes the following comment " The Kodiak Island form is separable from the more southern forms. This one is probably the more typical."; Red Bluff Bay, Alaska (Stephens); Ketchikan (Willett); San Francisco, Calif. (Lowe);

Thais canaliculata compressa Dall,1915. Type locality, Monterey. and ranges at least south to Cayucos. The specimens listed above from Cypress Point are of this variety and were collected by Mrs. John Q. Burch. ; " common under the mussel beds at Point Pinos (A.G. Smith);

Thais canaliculata analoga (Forbes),1850. Type locality, California !!! " Dr. A.M. Keen comments on this " T. analoga was described from California? I agree with your !!!" Mr. A.G. Smith has studied the variety and advises " Have not seen any specimens like the figure Dall has given. The figure he gives is for a shell from Lituya Bay, Alaska. At Union Landing (11 mi. N. of Ft. Bragg) and at the mouth of the Smith River in Mendocino Co. the Chaces found a form of canaliculata that approaches analoga in shape but does not have the intercalated ribs. Sculpture is finer and the ribs more frequent than for compressa from Monterey. I would say that analoga may possibly not have come from California, as stated by Forbes, and that Dall's citation of a figured shell from Lituya Bay perhaps fixes the type locality".

Thais emarginata (Deshayes),1839. Bering Island and the Okhotsk Sea on the west; on the east from Hagmeister Island , Bering Sea, and southward to California,Mazatlan, and Topolobampo,Mexico (Dall). Mrs. Oldroyd gave the type locality California but we are advised by Dr. A.M. Keen " T. emarginata was described from New Zealand, like so many other west coast forms".

Collecting data: It is amazing that we seem to have but two varieties of this species listed in Bull. 112. It is a very variable shell both as to shape and color. It is almost too common to list locality records- several localities around Puget Sound; Oregon coast; Crescent City, Calif.;Monterey; Cayucos; Morro Rock; Santa Barbara; Santa Monica; Pt. Firmin; San Pedro; Laguna Beach (Burch); " Have it all the way from Mazatlan, collected by Tremper, to Forrester Island, Alaska , collected by Willett " (A.G. Smith); Puget Sound, Prince Wm. Sound and Kodiak Islands collected by W.J. Eyerdam who comments as follows " In Puget Sound at Port Orchard, Kitsap Co., and at Zenith, King Co. I found red, orange,black,white,brown,spotted and alternate banded black and white and other combinations of color forms in the same colonies. In the Kodiak Islands I have found black,white and violet specimens. A hairsplitter could name dozens of color varieties if he were obsessed with the naming bug."; Point of Rocks, Lower Calif. (Stephens); Coronado jetty opposite Hotel (Bristol); San Diego (Kelsey); Rosarito Beach, L.C. (Trethewey); Point Loma (Lowe);

Thais emarginata ostrina (Gould),1852. Ellamar, Alaska to Point of Rocks, Mexico. Dr. A.M. Keen comments " My check list range 31 to 61 was based on specimens in Dr. Fred Baker's collection.."

Collecting data: We collected specimens fitting the description of this variety around Monterey, Calif. but doubt that it has any systematic significance (Burch); " a form normally found on wave-washed rocks along the ocean front. Very large specimens are found along the ocean face of the Monterey Peninsula (A.G. Smith); Golden Gate, Calif. (Hemphill); Trinidad, Calif. (Frank Stephens); Point of Rocks, L.C. (Kelsey); Alameda and Cypress Point, Monterey (Lowe)

Thais emarginata projecta Dall,1915. Dall listed this from Tillamook,Ore. but Keen Abridged Check List brings the range on south to San Francisco.

Collecting data: " Have not seen this from the San Francisco region. My emarginata from Land's End at the mouth of the Bay are rather small,smooth, chunky, and run a gamut of colors, many being pure yellow (A.G. Smith); Orcas Island (Oldroyd); Sitka,Alaska (Lowe); Ketchikan and Coco Harbor, Dall Island (Willett).

Subgenus Stramonita Schumacher,1817. Type (by sub. desig.Cossmann) Buccinum haemastoma Linnaeus.

Thais biserialis (Blainville),1832. Dall,1923 (Additions etc. to Bull. 112 listed this species from La Jolla. It does occur on the outer coast farther south and it is possible that a stray specimen might have reached La Jolla. But it is definitely not of the fauna north of San Diego.

The following keys and list of species from Mr. A.M. Strong's notebook will be of interest.

Genus

Shell without varices or axial ribs

. Outer lip with an anterior tooth or horn.............. Acanthina

. Outer lip evenly dentate or smooth

.. Columella with a single plication .... Cuma

.. Columella without a plication

... Spire evident, more or less prominent .... Thais

... Spire minute, body whorl limpet shaped .... Concholepas

Genus Acanthina

Surface more or less tuberculate

. Upper row of tubercles very prominent

Gulf of California to Peru .... tuberculate

Reeve, Monoceros, pl.2, fig5'

. Several strong,tuberculate,scaly,spiral ribs

Length 65 mm. Gulf of California to Ecuador ...... muricata

Reeve, Monoceros, pl.2, fig.4

. Three rows of widely spaced white tubercles

Length 30 mm. Panama to Peru .... brevidentata

Reeve, Monoceros, pl.1, fig.4

Surface not tuberculate

. Whorls with a concave tabulation

.. Spiral cords large, entire surface scaly

Length 85 mm. Galapagos .... grande

Reeve, Monoceros, pl.2, fig.6

.. Spiral cords fine, more or less scaly

Length 55 mm. Chile to Patagonia .... calcar

Reeve, Monoceros, pl.3, fig.12

. Whorls strongly angulated

.. Surface with a network of fine lines

Length 26 mm. Gulf of California .... angelica

Nautilus, vol.32, p.26

.. Entire surface scaly

Puget Sound to San Diego .... spirata

Oldroyd, vol.2, pt.2, p.47

.. Body whorl smooth or nearly so

Puget Sound to San Diego.......................... spirata var. unicarinata

. Whorls rounded or slightly angulated

.. Surface nearly smooth

... Light colored with small, rounded dark spots

Monterey to San Tomas .... spirata var. punctulata

... Light lines between large, squarish, dark spots

15 mm. San Pedro to Cerros Island .... paucilirata

Oldroyd, vol.2, pt.2, p.48

.. Surface with 3 or 4 strong spiral cords

Length 50 mm. San Diego to Galapagos Islands ... lugubris

Oldroyd,2-2-48; Reeve,Monoceros,pl.3,f.7

.. Surface with scaly spiral cords or smooth, very thick

Peru to Magellan Strait........................ unicornis

equals crassilabrum Lamarck ; Reeve, Monoceros, pl.4, fig.14

Genus Thais

Columella broad, flattened or excavated
• Columella uniformly white or brownish
Length 25 mm. Panama to Peru .... callaoensis
Reeve, Purpura, pl.13, fig.79.
• Columella white, edges with red
Length 50 mm. Peru .... delessartiana
equals blainvillei Desh. Reeve, Purpura, pl.9, fig.41
• Columella uniformly orange red
•• Inside of outer lip uniformly chocolate brown
Length 75 mm. Peru and Chile .... chocolata
Reeve, Purpura, pl.5 5, fig.22
•• Inside of outer lip tinged with red
Length 75 mm. Gulf of Calif. to Chile .... columellaris
Reeve, Purpura, pl.2, fig.9
• Columella white, with an oblong black spot in the center
Length 60 mm. Lower California to Peru .... planospira
Reeve, Purpura, pl.3, fig.14
• Columella red with a brown area at the top
Length 100 mm. Lower Calif. to Peru .... patula
Reeve, Purpura, pl.2, fig.9
Columella not greatly flattened or excavated
• Sculpture not tuberculate
•• Sculpture of sharp spiral cords
••• Cords on the shoulder of the whorls the most prominent
Length 50 mm. Bering Sea to Santa Barbara .... lamellosa
Oldroyd, vol.2, pt.2, p.42
••• Spiral cords alternating in strength
Length 60 mm. Arctic Ocean to Cerros Island .... lima
Oldroyd, vol.2, pt.2, p.44
••• Spiral cords uniform, sharp, narrow
Length 30 mm. Bering Sea to Monterey .... canaliculata
Oldroyd, vol12, pt.2, p.46
••• Spiral cords roughened or subspinose
Length 30 mm. Bering Sea to Cerros Island ...... emarginata
Oldroyd, vol.2, pt.2, p.44
•• Sculpture of impressed spiral lines or grooves
Length 50 mm. Panama to Peru .... crassa
equals melo Desh. Reeve, Purpura, pl.4, fig.17
• Sculpture with small, subobsolete tubercles
•• Columella and interior of aperture orange red
Length 90 mm. La Jolla to Peru .... biserialis
equals bicostalis Reeve, Purpura, fig.28
•• Columella and edge of lip purple brown
Panama .... intermedia
equals hippocastanum Lam. Rve. Purpura, pl.8,fig.38,
Purpura,pl.11,fig.60
• Sculpture with sharp, pointed tubercles
•• With or 2 spiral rows of tubercles
••• Surface with strong lamellae of growth and fine spiral striae
Length 60 mm. Magdalena Bay to Peru .... kiosquiformis
Reeve, Purpura, pl.7, fig.31
••• Surface with fine, regular, spiral striae
Length 25 mm. Gulf of California to Peru .... triangularis
equals carolensis Reeve, Purpura, pl.11, fig.57
(con.)

.. With 3 rows of pointed tubercles
Length 35 mm. Gulf of California to Acapulco .... triserialis
equals speciosa Reeve,Purpura,11,fig.56

Family Thaisidae

Genus Thais Roeding,1798

Subgenus Nucella Roeding,1798

Nucella emarginata Deshayes,1839	Bering Sea to Mexico
Nucella lamellosa Gmelin,1792	Bering Sea to Santa Barbara
Nucella lima Martyn,1788	Arctics to Cerros Island

Subgenus Stramonita Schumacher,1817

Stramonita biserialis Blainville,1832	La Jolla to Peru
Stramonita callaoensis Gray,1828.	Panama to Peru
Stramonita chocolata Duclos,1832.	Peru and Chile
Stramonita crassa Blainville,1832	Panama to Peru
Stramonita delessartiana d'Orbigny	Lower Calif. to Peru
Stramonita peruensis Dall,1909.	Peru
Stramonita triangularis Blainville,1832.	Gulf of Calif. to Peru
Stramonita triserialis Blainville,1832.	Gulf of Calif. to Acapulco
! Stramonita kiosquiformis Duclos,1832.	Magdalena Bay to Peru

Subgenus Purpurella Dall,1872

Purpurella columellaria Lamarck,1822	Gulf of Calif. to Chile
Purpurella patula Linnaeus,1758.	Gulf of Calif. to Peru

Subgenus Tribulus Klein,1753

Tribula planospira Lamarck,1822	Lower Calif. to Peru

Subgenus Thalessa H. & A. Adams

Thalessa heptagonalis Reeve	Panama
Thalessa intermedia Kiener	Panama

Genus Acanthina Fischer,1807

Acanthina angelica Oldroyd	Gulf of California
Acanthina brevidentata Mawe (Wood)	Panama to Peru
Acanthina calcar Martyn	Chile
Acanthina grandis (Gray) Sowerby	Galapagos
Acanthina lugubris Sowerby,1822	San Diego to Galapagos
Acanthina muricata (Gray) Broderip,1832.	Gulf of Calif. to Ecuador
Acanthina paucilirata Stearns	San Pedro to Cerros Island
Acanthina spirata Blainville,1832	Puget Sound to Cerros Island
Acanthina tuberculata Gray	Gulf of Calif. to Peru
Acanthina unicornis Brug.	Peru and Chile

Genus Cymia

Cymia tectum Wood,1828	Panama to Ecuador

Genus Concholepas

Concholepas loco Molino,1782.	Peru and Chile

Genus Acanthina Fischer de Waldheim,1807. Type (by subsequent designation, Gray,1847), Buccinum monoceros Chemnitz = Buccinum calcar Mart.
" Shell short, with small spire, large body whorl, and very short anterior canal; spiral sculpture usually present but varices and axial sculpture absent; aperture ovate, parietal wall usually with a delimited callus deposit, a projecting tooth present at some growth stages on anterior portion of outer lip" (Grant and Gale, p.719).

Subgenus Acanthina s.s.

Acanthina lugubris (Sowerby),1822. San Diego south to Panama and the Galapagos Islands. Type locality not given.

Collecting data: A very abundant species on the rocks around Todos Santos Bay especially those immediately north of Ensenada. Have never seen it from San Diego but there is no reason not to expect an occasional specimen when it is so common fifty miles to the south (Burch); " Have seen no shells of this species that were actually collected at San Diego (A.G. Smith); and the San Diego Museum of Natural History reports " All of our specimens are from Lower California and the Gulf."

Subgenus Acanthinucella Cooke,1918. Type (by original designation) Acanthina punctulata Sowerby.

Acanthina spirata (Blainville),1832. Puget Sound to San Diego and Socorro Island. Type locality: " Des iles Sandwich" (an error presumably based on a ballast shell) (fide Grant and Gale). We have so many of these erroneous type localities that it deserves an occasional comment. Dr. A. Myra Keen expresses the opinion of many in a brief note " Confidentially-- I don't see why ballasting is invoked so often to account for erroneous type localities. In those early days when ships called at many ports and exactitude of records seemed not very important anyway, why shouldn't many a mistake have been made ! Even in this enlightened age we sometimes mix labels."

Collecting data: Our experience has been to find this the most common of all gastropods from Monterey to San Diego. Common above high tide mark on pilings, rocks,floats etc. Mytilus beds inside and outside of the estuaries etc. We have labelled the sharply terraced specimens as the typical and the round form the variety.(Burch); not common in Monterey Bay. Would rate it scarce there (A.G. Smith); San Quintin and Todos Santos Bay, L.C. to Tomales Bay, Marin Co.,Calif. (San Diego Museum); Santa Rosa Island, Calif. (Fleming).

Acanthina spirata aurantia Dall,1908. This is the yellow albino form common enough in all colonies of the species. It is of no significance in my opinion. I have many specimens of exactly the same thing in other species such as the Acanthina lugubris if anyone cares to name a lugubris aurantia or citrica. (Burch); Laguna Beach (Lowe); Santa Monica (Clark).

Acanthina spirata punctulata (Sowerby),1835. Monterey, Calif. to San Tomas, Lower Calif. and Socorro. We have been labelling the round shouldered form with this name. Many local collections have it as A. lapilloides (Conrad)

Collecting data: Monterey, Calif. very common; San Simeon,Calif. ,larger brownish specimens; Malaga Cove to Pt. Firmin along the Palos Verdes Estates; Laguna Beach; La Jolla; Rosarito Beach, L.C. (Burch); abundant in Monterey Bay, on rovks between tides (A.G. Smith); Piedras Blancas Light (Cass); Monterey (Hemphill); Cape Colnett, L.C.

Acanthina paucilirata (Stearns),1871. San Pedro, Calif. to Cerros Island, Lower Calif. Type locality, Coronado Islands.

Collecting data: This is the common form on the cliffs around La Jolla, Calif. and common all around San Diego. An interesting thing is that the specimens from Todos Santos Bay and Punta Banda and around to Arbolitos are very much larger than the La Jolla specimens (Burch); Rosarito Beach and Cape Colnett, Lower Calif.

Genus *Drupa* Roeding, 1798.

Dr. A. Myra Keen has stated the nomenclatorial data on this for us (Per. Comm. July,1945) " I agree that *Drupa* should be placed in the Thaisidae. According to my notions of classification, our west coast species belong to a subgenus of *Drupa* rather in *Drupa* s.s. Subgenus *Morula* Schumacher,1817. Type (orig. design.), *M. papillosa* Schumacher- *Drupa uva* Roeding. These are small shells, usually biconic, with nodose sculpture. The type of *Drupa* s.s. is (monotypy), *D. morum* Roeding- *Nerita nodosa* Linnaeus. This is the same biologic entity later named *Ricinula horrida* by Lamarck; the *Drupa uva* was named *Ricinula morus* by Lamarck."

" Animal and radula the same as in *Thais*. Shell ovate or subfusiform, solid; whorls tubercular, spinose, or longitudinally costate; aperture narrow, oblong, canaliculate above, with a short canal below; outer lip furnished with strong teeth within; inner lip wrinkled or plicated. Operculum oval,straight, with lateral nucleus." (Suter,1913,p.428).

Subgenus *Morula* Schumacher,1817.

Drupa lugubris (C.B. Adams),1852. Redondo Beach, Calif.(Burch) to Panama. Type locality, Panama.

Thomas A. Burch in Nautilus 54:46, pl.2, figs. 5,6,7 published an article announcing the addition tp the Californian fauna of this species. It was dredged off Redondo Beach, Calif. in 25 fathoms, gravel bottom. It was our opinion at the time that the species belonged to the genus *Cantharus*.

However, Dr. Jeanne S. Schwengel in Nautilus 56:77,78, pl.7, fig.7 described and figured *Drupa didyma* from the Atlantic coast being named for its resemblance to *lugubris* of this coast.

We are accepting Dr. Schwengel's advice that the species is properly placed in the genus *Drupa*.

It is rather surprising that this species has not been collected and reported before this time because it is by no means rare. We have probablty taken over 100 specimens. And it is not uncommon in some of the Pleistocene deposits such as the Baldwin Hills of Los Angeles county. The fossils had been rather generally confused with *Fusinus*.

It is interesting to note that Pilsbry and Lowe called this species *Latirus* and were followed by Maxwell Smith in Panamic Marine Shells who lists *Latirus lugubris* (C.B. Adams) under Fasciclariidae.

Additions and Corrections

The following data was received after publication and should supplement Minutes #51. The notes are by Mr. A.G. Smith.

Trophon triangulatus Cpr.- Monterey Bay 20-40 fms.. on shale;rare. The best figure of this species is by Dall, Proc. USNM, v.14, no.849, pl.5, f.3,type specimen.

We are using the genus *Boreotrophon* and *Trophonopsis* but these additions will be stated asr received from Mr. Smith.

T. avalonensis Dall- We have not seen this from Monterey. If your specimens are correctly named, this makes an addition to our Monterey list.

Note- the Burches listed this species dredged off Monterey but prefer to have our classification rechecked by Mr. Smith before adding or extending any list or range.

T. disparilis Dall- 40 fms. off Mendocino Co. coast. (CAS).

T. calliceratus (Dall)- A single specimen, 65-71 fms. off Pt. Pinos (USFC) may be this species although it resembles *T. triangulatus*, also.

T. bentleyi Dall- About 100 fms. off La Jolla.

T. lasius (Dall)- 152-495 fms. off Pt. Pinos (USFC); source.

(con.)

T. multicostatus (Esch.)- Reported by Cooper from Monterey but his record has not been confirmed by recent collecting.
T. smithi (Dall)- '46-71 fms. off Pt. Pinos (USFC); scarce. Beach at Pt. Pinos, a single specimen (A. Sorensen).
T. stuarti E.A. Smith- 202 fms. Monterey Bay (USFC); rare.
T. triphorus (Dall)- 581 fms. in Monterey Bay (USFC); rare.
T. peregrinus (Dall)- According to MacKenzie Gordon, who examined the type of both species in the USNM, this and *triangulatus* are the same and the former therefore goes into synonymy.

Family CORALLIOPHILIDAE

Genus *Coralliophila* H. & A. Adams.1853. Dr. A. Myra Keen states some of the problems involved in this group (Per. Comm. July,1945)-
" Genotype of *Coralliophila* H. and A. Adams,1853, is (subsequent designation, Cossmann,1903); *Purpura neritoidea* (Lamarck) - *Pyrula neritoidea* Lamarck--*Murex neritoideus* Gmelin (preoccupied by *M. neritoideus Linne*)= *Purpura violacea* Kiener,1836.

In other words, Lamarck's familiar name of *neritoidea* must fall as a homonym and the next available synonym must be adopted; namely, *Coralliophila violacea* (Kiener).

The genotype is a low spired with squamous sculpture throughout and with an open canal. For the keeled forms with fairly high spire and more or less regular spines at the shoulder the following subgeneric name seems appropriate:
Mipus De Gregorio,1885. Type (fide Dall,1902; apparently by monotypy); *Trophon gyratus* Hinds.

I notice that Tomlin,1935 (Jour. Conch., vol.20, pp. 180-183) places *gyratus* in *Latiaxis* and suggests that *Latiaxis* is doubtfully distinct from *Coralliophila*. In other words, he would lump *Pseudomurex*,*Latiaxis*,*Mipus*-etc. all in *Coralliophila*. I am wondering, however, if *Latiaxis* would not be appropriate for the two or three loosely coiled forms like the genotype *L. mawae*; *Mipus* for the tightly coiled, keeled forms; *Pseudomurex* for the high spired forms with corded rather than squamous sculpture; and *Coralliophila* s.s. for the low spired, squamously sculptured species. The type of *Pseudomurex* is *bracteatus* (Brocchi) (not *braceatus*, as Maxwell Smith records it.) "

I have on my table at this moment the genotype of *Coralliophila*, a large series of the local species we have been allocating to this genus, and several large sets of the Japanese species . The Japanese shells and ours are obviously related, but if there is any relationship between either of them and the globular,white with lavender aperture, *Coralliophila violacea* it is not to be observed in the shells. Hirase used the genus *Latiaxis* for the Japanese species resembling our Californian shells and *Coralliophila* for the others. I feel that Hirase was right and propose to use *Latiaxis* for our species. Having collected hundreds of these shells I know that there is certainly no coral connected with the habitat. They must have a very different ecology from the coral reef species. It is quite probable that our species should go into an entirely new or different genus, but it seems that they are at least much closer to the Japanese *Latiaxis* than they are to *Coralliophila*.

Latiaxis costata hindsii (Carpenter),1857. Point Conception to Panama. Type locality, Panama.

It is the personal opinion of John Q. Burch that the local species we have been dredging in large numbers off Redondo Beach,Catalina Island and elsewhere along the coast is *hindii* and that *hindii* is but a race of the older *costata* Blainville.

Maxwell Smith in his book " The Rock Shells",1939 figures a specimen under the name of Coralliophila muricata (Hinds),1843, his number 490 and figured on pl.21,fig.13. Of course, muricata was described by Hinds under Trophon where the name was preoccupied by Montagu and Carpenter changed it to Trophon hindsii for that reason. Therefore, the species we should have as hindsii is the species described by Hinds in Voy. Sulphur,14,t.,1,f.16 and the southern California specimens compare very well with Hinds figures of which there are two. Maxwell Smiths figure mentioned above is obviously not a figure of Hind's type but is very obviously the same species we have under consideration. Smith also figures a specimen under the name of C. costata Blainville, pl.21,fig.3. If Smith's figure is correctly identified the relationship to hindsii is apparent. The range of costata is given by Smith as Catalina Island, Calif. south to Panama and the Galapagos, but the California record for typical costata is very questionable. However, all descriptions of costata indicate that it is very close to hindsii and as stated above it is the opinion of this writer that they are not specifically distinct.

J.R. le B. Tomlin " Catalogue of Recent Latiaxis", Journ. Conch. vol.20, no.6, pp.180-183,1935 lists these species questionably under that genus. The student of this group should consider Pseudomurex Monterosato with type Murex bracteatus Brocchi,1814. Maxwell Smith gives a figure of this species under the name braceatus in his " Rock Shells", pl.21,fig.6 but he states that the specimens came from off North Carolina and Florida. Brocchi's species was described as an Italian Tertiary fossil. The shell Smith figures is clearly close to the group being discussed. The type of Latiaxis Swainson, 1840 is L. mawae (Griffith and Pidgeon),1834. This is the extreme of the loosely coiled species. It is not too rare from Japan. Hirase figures it beautifully in his Japanese Shells,1934, pl.111, fig.2. L. pilsbryi Hirase is very similar to the type but Hirase also figures a number of other species on the same plate indicating the connection between the very loosely coiled species and the species such as japonica (Dunker). If the above conclusions are in error we will be pleased to have the matter explained. It is very obvious that there is a great deal of confusion in all west coast collections regarding these species. We will list the species described from this coast or rather the names in general use. Unfortunately the same species appears in different collections under several different names.

Coralliophila oldroydi Oldroyd,1929. Nautilus 42:98,99,1929, pl.5, figs. 1-4. Type locality: Bird Rock off Isthmus, Catalina Island. Range to Galapagos. The description follows:

" Shell large, heavy, aperture one half the length of the shell, with a row of horizontal scales on the shoulder, and four heavy spiral ridges below the shoulder on the body whorl. There are fine spiral ridges on all the whorls. Aperture of a greenish white, canal short. It differs from C. hindsii Carpenter, in having the shoulders nearly straight, and only a faint trace of scales where the body whorl joins the next one. The shoulders in C. hindsii are very sloping. Length of shell 47 mm."

" Named in honor of T.S. Oldroyd who collected it some 34 years ago. It has gone under the name of Coralliophila hindsii Carpenter."

Many of the correspondents of the Burches have this species or rather a species labelled with this name dredged off Redondo Beach, Calif. They were so labelled on the assumption that Mrs. Oldroyd figured very worn or dead shells plus some immagination. Our shells being pearfect specimens show frills,spines etc. We have changed the labels on our specimens to the name L. costata hindsii Carpenter. However, we are far from agreed on this practice. The following note from Dr. A. Myra Keen gives us some light (Per. Comm. July,1945) " After careful examination of the type material of C. oldroydi, I am inclined to reject it as a synonym of C. hindsii Carpenter. One of Mrs. Oldroyd's paratypes came from the Galapagos Islands. I had thought, from a preliminary study of material at the National Museum, that perhaps oldroydi would apply to the form with upcurved spines at the shoulder, hindsii to the form with spines slanting downward or outward, but this may be rather an arbitrary distinction. The holotype of oldroydi is not dead or worn, as you suggest, but is large and fully adult; young specimens in the type lot show numerous recurved spines. The type lot was collected by Mr. Oldroyd directly from the outer surf-beaten rocks of Catalina Island: he managed to reach the rocks from a row boat but nearly capsized in leaning over to pick the shells off."

Note- the last line of Dr. Keen's comment certainly indicates no coral habitat for these California species.

Coralliophila costata (Blainville),1832. San Miguel Island, Calif. to Panama. Type locality, Mazatlan,Mexico.

This name probably appears on more sets of our California specimens than any other. Mr. George Willett commented briefly on it " Doubtfully Californian". The Lowe collection in the San Diego Museum used this name entirely and listed the species from the following collecting localities: Tres Marias Islands,Mexico; Cape San Lucas; San Marcos Island,Gulf of Calif.; Conception Bay; Carmen Island, Gulf of Calif.; Mazatlan,Mexico; Catalina Island and San Clemente Island, Calif.; Coronado Islands, Mex.

Coralliophila kincaidi Dall,1919. This species was described from Puget Sound but is thought to be merely a specimen of Ocenebra lurida, and we propose to drop it from our faunal list. Dr. A. Myra Keen explains the matter (Per. Comm. July,1945) " Studying the holotype of Coralliophila kincaidi Dall at the National Museum, I came to the conclusion that it is an unusually well developed Ocenebra lurida aspera. There is a specimen of the latter in the Stanford collection that matches the holotype figure very well (Oldroyd, vol.2, pt.2, pl.30, fig.13); in the same lot are three other specimens with the characteristic closed canal of Ocenebra. Apparently Dr. Dall was led to make this allocation on the basis of the open canal of his specimen."

In the light of the above discussion the following key and list of species from Mr. A.M. Strong's notebook will be of particular interest.

Genus Coralliophila

Shell with distinct axial ribs
. Spiral sculpture of numerous fine striae
25 mm. Gulf of California to Panama .... nux
equals Tritonalia parva E.A. Smith Maz. Cat. #611
. Spiral sculpture of irregular, unequal spiral cords
.. Axial ribs about 9
30 mm. Puget Sound .... kincaidi
Oldroyd, vol.2, pt.2, p.50
.. Axial ribs about 16
23 mm. Lower California .... stearnsiana
Proc. USNM, vol.56, p.340 sp. 496, pl.21, fig.7
. A strong peripheral and numerous secondary cords
22 mm. Magdalena Bay .... orcuttiana
Proc. USNM,vol.56, p.339; sp.492, pl.20,fig.21

. Spiral sculpture of numerous rows of erect spines
Peru .... cardua
Reeve,Murex, vol.28, p.125
Shell without distinct axial ribs
. Shell with distinct spiral keels
.. Shoulder with a strong tuberculate keel
32 mm. San Miguel Island to Peru .... costata
Maz. Cat. #610; sp. 480, pl.21, fig.3.
.. Shoulder with flat, horizontal spines
... Body whorl with a second row of spines
17 mm. Panama .... hindsii
Reeve, Murex, 31-147; sp. 490,pl.21, fig.15
... Body whorl with 4 strong spiral cords
47 mm. Catalina Island .... oldroydi
Nautilus 42:98
.. Whorls with several, irregular, sharp keels
Ecuador .... scalariformis
Reeve, Purpura, 13-75; sp. 495, no figure
. Shell with fine spiral striae only
.. Columella flatly depressed
30 mm. South Pacific .... monodonta
Tryon, vol.2, p.212 as madreporarum

Genus Coralliophila

Coralliophila oldroydi Oldroyd,1929.	Catalina Island and Galapagos
Coralliophila costata (Blainville),1832	San Miguel Island to Peru
Coralliophila orcuttiana Dall,1919.	Magdalena Bay
Coralliophila stearnsiana Dall,1919.	Lower California
Coralliophila nux Reeve	Gulf of Calif. to Panama
Coralliophila hindsii Carpenter,1856	Panama
Coralliophila scalariformis (Lamarck),1822	Ecuador
Coralliophila cardua (Broderip),1832	Peru. Gulf of California.

Genus Quoyula

Quoyula monodonta (Q. & G.),1832	South Pacific

Genus Coralliobia

Coralliobia fimbriata A. Adams	Panama

Family EPITONIIDAE

We are following the great majority of modern authors in the use of the above family name. However, there are a number using the name Scalidae . Theile in " Handbuch der Systematischen Weichtierkunde",1929, p.222 uses Scala (Klein 1753) Bruguiere,1792. Dr. Joshua L. Baily Jr. gives us some discussion of this problem (Per. Comm. Aug.,1945) " In response to some of the questions raised by your last communication dealing with Epitonium, Janthina, and Eulima and their families there is much to be said. First, you will notice that Theile uses the name Scala instead of Epitonium .Scala was originally used by Klein, a pre-linnean author. The International Commission on Zoological Nomenclature has ruled that pre-linnean names are available only when validated by a post-linnean writer. In this case Bruguiere used the name in 1792, according to Theile. But the use of a name does not necessarily validate it. The later author must adopt it. If he merely quotes it in synonymy he does not validate it. I do not have a copy of Bruguiere, but it seems to me that if he merely copied this name in the synonymy of some other name that other name would be the one to use.(unless it had already been used in some other sense), but as no other name has ever been used until Bolten suggested Epitonium in 1798 it looks to me as if Scala had been adopted and therefore validated by Bruguiere. But I have not seen a copy of Bruguiere and would not wish to suggest the use of a name that has been discarded by practically everyone I know, but I do feel that the question is not yet settled, and cannot be without consulting Bruguiere."

The following key to genera of the family Epitoniidae will be of interest. Reference, Durham in Journal of Paleontology, vol.11,pp.483-484.

Key to the Epitoniidae

True varices present .... Epitonium
. Spiral ribs present
.. Basal disk present
... Surface of varices covered by network of crossed
spiral lines producing a decussate appearance....(Crisposcala)
.... Surface of varices not so covered
..... Body whorl very large, spire low ....(Sthenorytis)
..... Body whorl not large, spire high
...... Basal disk boned by a continuous keel,varices simple..(Boreoscala)
...... Basal disk not bounded by a continuous keel but by
short triangular posterior enlargements of varices..(Cirsotrema)
.. Basal disk absent .... (Asperiscala)
. Spiral ribs absent
.. Basal disk present ....(Gyroscala)
.. Basal disk absent
... Varices continuous over all whorls .... (Clathrus)
... Varices not continuous from whorl to whorl .... (Nitidiscala)
Varices absent;(true axial ribs present)
. Outer lip not sharp
.. Axial ribs passing onto the basal disk .... Acrilla
... Axial ribs usually not as heavy as spiral ribs; when
they are as heavy they simulate varices ....(Ferminoscala)
... Axial ribs heavier than spiral ribs,not varix-like..(Unidiscala)
.. Axial ribs not passing onto the basal disk .... Opalia
... Only very fine spiral striations present
.... Suture deep and with a sharp angulation just below it,
crenulated by upper margin of ill-defined axial ribs..(Dentiscala)
.... Suture moderately deep, without sharp angulation.....(Opalia s.s.)

(con.)

... Spiral ribs present
.... Distinct perforations in interspaces between ribs .....(Nodiscala)
.... Perforations not present
..... Basal keel visable in the suture
...... Axial ribs continuous from suture to suture........ (Confusiscala)
...... Axial ribs not continuous from suture to suture ....(Claviscala)
..... Basal keel not visable in the suture .... Rugatiscala
. Outer lip sharpened, shell heavy .... Acirsa

The following key from Mr. A.M. Strong's notebook is of value.

Genus Epitonium Subgenera
Shell with a basal disk bounded by a keel
. Surface with a spongy, punctate outer layer
.. Varices faint over whorls, pointed in the sutures... Nodiscala
.. Varices strong over entire surface of whorls .... Cirsotrema
. Surface with a thin, chalky outer layer
.. Varices partly obsolete,surface pitted............... Dentiscala
. Surface without a distinct outer layer
.. Spiral sculpture distinct
...Shell white
.... Varices terminating at the basal keel .... Punctiscala
.... Varices extending to the umbilical region .... Boreoscala
... Shell yellow or brown
....Sculpture evenly reticulated .... Ferminoscala
.... Occasional ribs strongly varicose .... Pictoscala
.. Spiral sculpture very fine or wanting
... Axial ribs strong and thick .... Opalia
Shell without a basal disk
. Spiral sculpture distinct
.. Varices forming a ridged fold bounding umbilicus....... Crisposcala
.. Varices rounding into umbilical region ....Asperoscala
. Spiral sculpture very fine or wanting
.. Shell distinctly banded with brown .... Hirtoscala
.. Shell white
... Shell slender,turrited .... Nitidiscala
... Shell short and broad
.... Varices thin and errect .... Globoscala
.... Varices thick and reflexed ....Sthenorytis

Genus Opalia H. and A. Adams,1853. Type (by subsequent designation, DeBoury,1886), Opalia australis (Lamarck).

Grant and Gale state " The species of the subgenus Opalia are higher spired and more tightly coiled than those belonging to the typical subgenus of Epitonium. They also possess a basal carina. The type E. australe is remarkably similar to E. wroblewski (Morch)."

We are not all in accord with giving Opalia generic standing. Dr. Joshua L. Baily Jr. states " Personally, I do not feel that Opalia is distinct enough to be made a genus, but if it is made a genus then Dentiscala should be made a subgenus of it rather than of Epitonium". However, Dr. A. Myra Keen advises " Opalia seems to me to be a good genus". George Willett commented " Most careful students of the group appear to use Opalia as a genus." Mr. A.G. Smith writes " Think Opalia should be considered a good genus and am so using it."

Opalia wroblewskii (Morch),1876. Vancouver Island to Forrester Island, Alaska. Reference for this range,Strong,Nautilus 51: 1937. Type locality

Vancouver Island, B.C.

Collecting data: Forrester Island, Alaska (G. Willett)

Opalia chacei Strong,1937. Nautilus 51:4,5, pl.2, fig.9. Type locality, Crescent City, Calif. Range, De Poe Bay, Oregon.(Burch) to Catalina Island, Calif.

Inasmuch as the original description of this species is not in Oldroyd we reprint it here--" Closely related to the preceding species (wroblewskii) and in some collections confused with it, is a more southern shell which is somewhat smaller,heavier, and proportionately broader. The eight heavy varices continue over the body whorl to the well-defined basal disk at all stages of growth, and the punctation of the outer layer of the shell is distinct in well preserved specimens. This may take the name of Opalia chacei The type, No. 1045, in the collection of the Los Angeles Museum, Los Angeles California, was collected by E.P. and E.M. Chace at Crescent City, Calif. It measures: length 28.3, maximum diameter 11.1 mm. Additional specimens were collected by Mr.and Mrs. Chace at Crescent City&on the coast of Mendocino county, Calif. The writer has collected specimens at Half Moon Bay, near San Francisco, and Mr. George Willett has dredged a specimen off Catalina Island.

The type of Opalia is given by DeBoury as Scala australis Lamarck , Recent, Australia and is well figured by Reeve. It is quite similar to O. chacei, having similar heavy varices and basal disk bounded by a cord. An examination of a fresh specimen in the collection of H.N. Lowe shows definite indications of a similar punctate outer layer on the upper whorls. It would seem that this punctate outer layer should be considered one of the important systematic characters."

Collecting data: De Poe Bay, Oregon; Crescent City, Calif.; Cayucos, Calif.; dredged in 20 fms. off Monterey,Calif. (Burch); 1 specimen off Catalina Island in 50 fms. approaching wroblewskii (G. Willett); " we rate it scarse in Monterey Bay. Have it from several points along the Mendocino Co. coast (A.G. Smith); " rare on shore at Monterey" (Chace).

Opalia evicta (de Boury),1919. Forrester Island, Alaska to Magdalena Bay, L.C. Type locality, Neah Bay, Washington.

Mr. A.M. Strong mentions the possibility that this name must fall into the synonymy of O. montereyensis (Dall),1907. Reference Nautilus 51:6. Mr. A.G. Smith advises " I mention this species first as I suspect that O. evicta (de Boury) is a synonym. Based on 2 specimens from 25 fathoms off Del Monte, in mud, dredged by Berry. I believe both of these shells are in the USNM. Maybe Bartsch or Rehder would compare the two species and tell us whether theyare different."

However, the name evicta is in general use at this time, and we do not suggest a change until the above comparison may prove it necessary.

Collecting data: off Monterey in 10 fms.; Avalon,Catalina Island in 35 fms.; Redondo Beach in 25 and 35 fms. gravel; off Newport Bay, Calif. (Burch); Monterey Bay, beach drift to 35 fms., scarce (A.G. Smith); Forrester Island,Alaska,Cayucos,Calif. and San Pedro (G. Willett);

Opalia montereyensis (Dall),1907. Monterey to San Pedro, Calif. Type locality, off Del Monte, Calif. in 25 fms. See discussion under preceding species.

This species was described under subgenus Cirsotrema. Discussed by Strong in Nautilus 51:6,7,(1937).

We will tentatively place Opalia tremperi Bartsch,1927 under Epitonium subgenus Nodiscala.

Subgenus Dentiscala De Boury,1886. Type (by monotypy): Opalia (Dentiscala) crenata (Linne).

Having decided to give generic rank to Opalia it follows that the subgenus Dentiscala should be treated as a subgenus of Opalia rather than Epitonium. Dr. Joshua L. Baily Jr. expressed his opinion in our discussion under Opalia. Mr. George Willett briefly noted " I think nearer Opalia." Mr. A.G. Smith commented " Seems to me this falls more naturally under Opalia than under Epitonium."

The following key to the species of the subgenus Dentiscala is from Mr. A.M. Strong's notebook.

9 varices, basal disk with a coarse spiral rib
  6 whorls (decollated) 13.5 x 6 mm Gulf of Calif. ..... crenatoides
  Cal Acad. 19-4-47
12 varices, basal disk smooth, convex
  7 whorls (decollated) 17 x 7 mm. Monterey to Mexico.. insculpta
12 varices, sharp spiral sculpture present
  6 normal whorls 10.5 x 5 mm. Catalina Island .... nesiotica
  Oldroyd, 2-2-53

Opalia insculpta (Carpenter),1864. (E. crenimarginatum Dall,1917) Reference, Nautilus 52:10 by G. Willett. Opalia insculpta was described from the Pleistocene of Santa Barbara. Dr. Dall stated in describing crenimarginatum that it differs by having fine spiral surface sculpture. Mr. A.M. Strong states that the fine sculpture would be lost during fossilization, and therefore we should use Carpenter's fossil name for our Recent species.

Range: Monterey? to Puerto Libertad, West Mexico. Mr. A.G. Smith comments " We seriously question Dall's Monterey record."

Collecting data: This is no doubt our most common littoral species of this genus. Can it be possible that this species is generally commensal with the large green sea anemone, Cribrina xanthogrammica (Brandt) ? Our experience has been to usually find these Opalias near the base of the sea anemone. It is useless to list stations for such a common species which is abundant in our experience from Santa Monica,Calif. to Punta Banda,Mex. (Burch); Panama to Redondo Beach on sets in the San Diego museum; uncommon on the breakwater fronting the Coronado Hotel,San Diego; rare at Decenso, L.C.; uncommon in the rocks at Point Loma (W.K. Emerson); Santa Cruz Island, Calif. (G. Willett); Mrs. E.P. Chace calls attention to the fact that this species cannot be dropped into alcohol or preservative when taken because of the habit of throwing off purple dye that will stain the shells .

Opalia nesiotica (Dall),1917. Type locality, Catalina Island in 16 fms. and apparently known only from the type locality.

Opalia crenatoides (Carpenter),1864 is from the Gulf and listed in Mr. Strong's key above.

Genus Epitonium Roeding,1798. Type (by subsequent designation,Suter, 1913), Turbo scalaris Linnaeus (plus Scalaria pretiosa Lamarck).

" The section Epitonium s.s. which embraces large species with loosely coiled whorls and detached peristome, is not found fossil or living in America" (Woodring,1928).

Subgenus Nodiscala De Boury,1890. Type (by original designation) Nodiscala bicarinata (Sowerby).

" Shell small, slender, suture serrate; basal disk poorly developed; peristome complete,thick; sculpture consisting of obscure axial ribs and of spiral grooves; body whorl with two heavy spiral ridges, the lower one of which seems to limit the basal disk." (After Woodring) (Grant and Gale)

The following key and list of species of Nodiscala is from Mr. A.M. Strong's notebook. We will then take up a detailed discussion of the species in our fauna north of San Diego.

Subgenus Nodiscala

8 varices
9 whorls 9 x 3 mm. Oregon to Monterey .... spongiosa
Oldroyd 2-2-53
9 varices
7 whorls 1 x 4 mm. Acapulco .... mexicana
Proc. USNM 34-250
10 varices, fine axial ribs in interspaces
8 normal whorls 13 x 5.8 mm. Gulf of Calif. .... golischi
Cal. Acad/ 19-4-44
12 varices
9 whorls 10.5 x 3.5 mm. San Juan del Sur .... sanjuanense
Nautilus 45:115
14 varices, entire surface finely reticulate
7 whorls 7 x 2.5 mm. Catalina to Gulf of Calif. ... retiporosa
Cal. Acad. 19-4-45
15 varices, 10 to 20 threads
7½ whorls 6 x 2.3 mm Gulf of Calif. .... espirita
20 faint varices Mazatlan ....mazatlanica
26 faint varices San Clemente .... tremperi

Epitonium spongiosum (Carpenter),1864	Oregon to Monterey
Epitonium retiporosum (Carpenter),1864	Catalina to Gulf of Calif.
Epitonium mexicanum(Dall)1908	Gulf of California
Epitonium mazatlanicum(Dall)1908	Gulf of California
Epitonium espiritum B. H. & S., 1930	Gulf of California
Epitonium golischi B. H. & S. 1930	Gulf of California
Epitonium sanjuanense Lowe	Nicaragua
Epitonium ordeanum Lowe	Nicaragua
Epitonium tremperi (Bartsch),1927	San Clemente Island

Epitonium tremperi (Bartsch),1927. Proc. USNM, vol. 70, art.11, p.3, pl 1,fig.8. Discussed by Strong in Nautilus 51:7,1937. This species was described by Bartsch as Opalia tremperi. Type locality, on rocks at San Clemente Island and known only from type locality. However, Dr. A.M. Keen advises " A specimen in the Stanford collection was taken by W.E. Hewatt in 2-3 fathoms off Santa Cruz Island.

Epitonium spongiosum (Carpenter),1864. (Epitonium retiporosum (Carpenter)
Off Oregon coast in 50 fms. to Gulf of California. Type locality, Monterey, Calif.

This species and retiporosum , with type locality off Catalina Island in 40 fathoms, has been the subject of frequent discussion through the years. We have dredged them in large numbers from both type localities and insofar as we can see they are identical. When we presented this problem with the specimens to Mr. George Willett several years ago he replied as follows which

(See Page 21 for another key to Nodiscala)

was published in our Minutes #20, p.13, Feb.1943 " Your Epitonium spongiosum Carpenter are surely the same as all of my southern California specimens that I have been calling E. retiporosum . Perhaps the latter is a synonym of the former, which comes first on the page. If theyare the same, I have no idea what retiporosum is. I am inclined to believe they are identical and have changed my labels to E. spongiosum." Mr. A.G. Smith states " We rate retiporosum as a synonym. All specimens of this Nodiscala I have seen from California are one species, not two. Note you rate spongiosum as " common" in Monterey Bay. We rated it as rare, having taken only three or four specimens."

Collecting data: Common off Monterey on the shale off Del Monte in from 10 to 40 fathoms, also a common species off Redondo Beach, Calif. in 25 fms. and off Avalon, Catalina Island in 25 and 35 fathoms.(Burch); San Pedro in 20 fms.; Catalina Island in 30 fms.; Newport in 35 fms.(Willett); South Island, Los Coronados Islands,Mexico in 8 fms. (Baker); San Pedro Calif. in 30 fms. (Lowe); as retiporosum , Guaymas,Sonora,Mexico in 20 fms. and off Catalina Island in 50 fms. (Lowe).

Mr. A.M. Strong lists two subgenera here not represented in our California fauna.

Subgenus Punctiscala
8 varices
6 whorls 4.1 x 1.5 mm. Mazatlan .... carpenteri
Epitonium carpenteri Tap.-Caf. Gulf of California

Subgenus Pictoscala
18 minor varices, 1 or 2 major
7 whorls 10 x 4.5 mm. Panama .... purpuratum
Proc. USNM, 53:477
Epitonium purpuratum Dall,1917 Panama

Subgenus Acirsa Morch,1857. Type (by monotypy): Scalaria borealis Lyell. " Outer lip sharpened, shell heavy".

Epitonium boreale (Lyell),1842. Aleutian Islands, Alaska. Circumboreal. Johnson gives it from 'Greenland'. Figured in Oldroyd.

Dr. A. Myra Keen discusses this species (Per. Comm. Aug.1945) " The status of this name was discussed by Dall in 1889 (Bull. Mus. Comp. Zool. vol.18,p.308) who concluded that it was a synonym of the prior E. costulata (Mighels). However, as the latter is a homonym, boreale will stand. The reference cited in Bull. 112 and by Mrs. Oldroyd is defective. It should be: Scalaria borealis Lyell,1842 (Trans. Geol. Soc. London, ser.2,vol.6,p.136), based on an unnamed figure in Philosophical Trans.1835, pl.2,figs. 11,12. Type locality: fossil,(probably Pleistocene), Beauport,near Quebec. The exact date of Lyell's paper is uncertain; it probably is 1842, as that is the date of the title page; definitely it is not 1839, which is the date of the reading of the paper. Lyell implies but does not definitely state that Beck supplied the name; but according to the International Rules, Lyell must be considered the author."

Epitonium boreale ochotense (Middendorff),1849. Arctic near Bering Strait, Bering Sea and the Okhotsk Sea (Dall). Type locality, south coast of the Sea of Okhotsk.

Mr. Strong lists a species of this subgenus from the southern fauna.
Epitonium (Acirsa) exopleura Dall,1917. Cape San Lucas
Faint indications of axial sculpture only
7 Whorls 3.6 x 2 mm

Key to Species of Nodiscala (A.M. Strong)

Basal disk distinct
. Coronating points 8-9
.. Basal disk margined by swellings on the ribs
9 whorls 11 x 4 mm. Acapulco .... mexicana Dall
..Basal disk marginated by a series of pits
9 whorls 13 x 5.8 mm Gulf of California .... golischi B,H. & S.
. Coronating points 14
7 whorls (decollated) 7 x 2.5 mm. Catalina to Gulf of Calif. retiporosa
Basal disk indistinct
. Swollen varices present in addition to axial ribs
.. Axial ribs indistinct over the body of the whorls
7 whorls (decollated) 7.8 x 2.5 mm. San Clemente Id. ...... tremperi Bart.
.. Axial ribs strong over the body of the whorls
9 whorls 10.5 x 3.5 mm/ San Juan del Sur .... sanjuanense Lowe
. Swollen varices absent
.. Axial ribs indistinct over the body of the whorls
... Coronating points 8
9 whorls 9 x 3 mm. Monterey .... spongiosa Carpenter
... Coronating points more than 8
.... Coronating points 14-15
7 whorls (decollated) 6 x 2.3 mm. Gulf of Calif. .. espirita B.H. & S.
.... Coronating points 20
7 whorls 12 x 4 mm. Gulf of California .... mazatlanica Dall
.. Axial ribs strong over the body of the whorls
9 whorls 7 x 2 mm. San Juan del Sur .... ordenada Lowe

The above species have been described as Nodiscala , the type of which is Scala bicarinata Sowerby from the Philippines. This seems to be quite different from our shells.

Our shells seem to form a distinct group on the west coast, characterized by the coronating points in the suture, fine punctate sculpture and the thickened outer lip. However, they may have the basal disk present or absent and the swollen varices present or absent. In both my key to genera and subgenera and the one prepared by Durham the basal disk is a major character. Either these keys will have to be altered or this group broken up and distributed in other subgenera. In any case a different subgeneric name is needed.

Mr. Strong lists the following species in subgenera not represented in our fauna.

Subgenus Ferminoscala	
Epitonium ferminianum Dall,1908	Gulf of Calif. to Panama
Epitonium brunneopictum Dall,1908	Cerros Island
Epitonium pomphyolayx Dall,1889	Cape San Lucas to Galapagos
Subgenus Sthenorytis	
Epitonium turbinum Dall,1908	Galapagos

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Subgenus Boreoscala Kobelt,1902. Type Epitonium greenlandicum (Perry) " Shell usually white, with a basal disk bounded by a keel and both spiral and axial sculpture present" Arctoscala Dall,1908 and Liroscala De Boury 1909 are synonyms. Fide Grant and Gale,1931, p.856.

Epitonium greenlandicum (Perry) ,1811. Arctic Ocean near Pt. Barrow and southward on the west to northern Japan; on the east to Wrangell,Alaska. Circumboreal. Also Pliocene.(Dall). Johnson give the Atlantic range "Greenland to off Block Island, R.I., 10-109 fms." Type locality,Greenland.

Collecting data: Umnak and Unimak Ids., dead on beach (Willett).

Subgenus Asperiscala De Boury,1909. Type (by original designation), Scalaria bellastriata Carpenter.

" Shell without basal disk or carina; spiral sculpture present, axial lamellae somewhat spiny or angular at the shoulder".

We will give the key and list of species covering the coast from Mr. A.M. Strong's notebook and follow with the discussion of our species.

Asperiscala
Varicose ribs with a spine or expanded angle at the shoulder
. Varicose ribs 15 to 16
.. Spiral sculpture sharp over entire surface
7 whorls 17.5 x 10 mm. Monterey to San Diego .... bellastriata Cpr.
. Varicose ribs 18
.. Spiral striae absent near the suture
8 whorls (decollated) 12.5 x 6 mm. La Paz .... pacis Dall
.. Spiral threads irregular, showing faintly on ribs
8 whorls (decollated) 11.9 x 5.5 mm. Gulf of Calif. ..kelseyi B.H.& S.
. Varicose ribs 20 to 21
.. Spiral threads very close and fine
5 whorls (decollated), 4.5 x 2.5 mm. La Paz .... imperforata Dall
. Varicose ribs 26 to 27
.. Spiral threads sharp, close
5 whorls (decollated) 7 x mm. Catalina .... lowei Dall
Varicose ribs without spine or angulation at the shoulder
. Varicose ribs 6
.. Spiral threads on base only
6 whorls (decollated) 8 x 5 mm. Magdalena Bay.... canna Dall
. Varicose ribs 10 to 12
.. Spiral sculpture of fine striae
... Varicose ribs slightly reflected, wider in suture
6 whorls (decollated) 7 x 3 mm. Magdalena Bay .... tinctorum Dall
... Varicose ribs rather low, sharp, errect
8 whorls, 6 x 3 mm. Panama .... zeteki Dall
.. Spiral sculpture of raised threads
... Varicose ribs nearly encircling the spire
5 whorls (decollated) 5 x 2.5 mm. La Paz-Acapulco..acapulcana Dall
... Varicose ribs about half encircling the spire
.... Varicose ribs rather solid, smooth
8 whorls (decollated) 9.5 x 4 mm. San Diego to Gulf.. cookeana Dall
.... Varicose ribs low, thin, sharp
7 whorls (decollated) 5.5 x 3 mm. Cape San Lucas .... xantusi Dall
. Varicose ribs 13 to 14
.. Spiral sculpture of fine striae
... Varicose ribs feeble on upper whorls
8 whorls (decollated) 14 x 5.5 mm. San Pedro .... arnoldi Dall
.. Spiral sculpture of strongly incised lines
... Varicose ribs thin, strongly reflected
10 whorls, 4.3 x 2 mm. Taboga Island .... sleveni S. & H
Varicose ribs without spine or angulation at the shoulder
. Varicose ribs 13 to 14
.. Spiral sculpture of raised threads
... Varicous ribs continuous
8 whorls (decollated) 10 x 4.5 mm. Magdalena Bay ... keratia Dall
... Varicose ribs not continuous,sharp
4½ whorls.(decollated) 3.5 x 1.7 mm. Galapagos .... emydoneda Dall
". (con.)

- Varicose ribs 16
  - Spiral sculpture of fine striae and a peripheral thread
    6 whorls (decollated) 7.5 x 3.5 mm. .Laguna.Beach ..... lagunarum Dall
  - Spiral sculpture of evenly spaced threads
    9 whorls, 3.7 x 1.4 mm. Manzanillo
- Varicose ribs 19-20
  - Spiral sculpture of uniform, fine threads
    6 whorls 3 x 1.5 mm. Panama Bay .... onchodes Dall

Epitonium bellastriatum (Carpenter),1864	Monterey to San Diego
Epitonium lowei Dall,1906	Catalina
Epitonium cookeanum Dall,1917	San Diego to Gulf of Calif.
Epitonium lagunarum Dall,1917	Laguna
Epitonium arnoldi Dall,1917	San Pedro
Epitonium keratium Dall,1917	Magdalena Bay
Epitonium tinctorum Dall,1917	Magdalena Bay
Epitonium cannum Dall,1919	Magdalena Bay to Gulf of Calif.
Epitonium xantusi Dall,1917	Cape San Lucas to Tres Marias Ids.
Epitonium pacis Dall,1917	La Paz
Epitonium imperforatum Dall,1917	La Paz
Epitonium acapulcanum Dall,1917	La Paz to Acapulco
Epitonium kelseyi B. H. & S.,1930	Gulf of Calif.
Epitonium indistinctum (Sowerby),1844	Gulf of Calif.
Epitonium onchodes Dall,1917	Panama
Epitonium emydonedum Dall,1917	Galapagos
Epitonium sleveni S. & H.	Taboga Island
Epitonium zeteki Dall	Panama

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Epitonium bellastriatum (Carpenter),1864. Monterey to Todos Santos Bay, Mexico (Burch). Type locality, Monterey

Collecting data: In our experience this is one of the more common dredged forms. Common off Monterey on the shale in 10 to 20 fms.; common off Redondo Beach from 25 fms. down to 75 fms.; off Santa Monica in 15 fms ; off Ensenada,Mexico in 36 fms. A common Pleistocene fossil in many deposits such as Timm's Point, Baldwin Hills etc. (Burch); Monterey Bay, 10-25 fms in fine sand and shale fragments, fairly common (A.G. Smith); San Diego and Ocean Park (Baker); South Island, Los Coronados, 10-18 fms. (Baker); Newport and Long Beach (Lowe);

Epitonium lowei (Dall),1906. Catalina Island to San Diego.
Type locality, off Avalon, Catalina Island, Calif. Dr. A.M. Keen advises that Kelsey dredged this species off San Diego in 40 fms.
Mr. A.M. Strong dredged it off White's Landing, Catalina Island in 30 to 40 fms.

Epitonium cookeanum (Dall),1917. San Diego to the Gulf of California.
Type locality, San Diego, Calif.
Epitonium arnoldi (Dall),1917. San Pedro, Calif.
Epitonium lagunarum (Dall),1917. Laguna Beach,Calif.
The last two species are apparently known only from the types.

Subgenus Nitidiscala De Boury,1909. Type (by original designation), Scalaria unifasciata Sowerby.
* Shell small, rather slender, turretted, without a basal disk; axial

sculpture consisting of strongly reflected retractive axial ribs fused across the sutures; spiral sculpture absent."

Reference- Strong, A.M., Trans. San Diego Soc. Nat. Hist. vol.6, no.7, pp. 183-196, pl.20.

A little note on spelling may be of interest. Dall in Bull. 112 and others have used the spelling Nitidoscala,Asperoscala etc. Dr. A.M. Keen advises on this " The original spelling is Nitidiscala. However, even the French are'nt consistent. French names beginning with de are spelled with the small letter only when the first name is given , as Alcide d'Orbigny. Otherwide D'Orb."

We will again give the keys and lists of species from Mr. A.M. Strong's notebook and then take up a discussion of our species.

Nitidiscala. Alaska to San Diego
Varicose ribs with a spine or expanded angle at the shoulder
. Varicose ribs 10 to 12
.. Shell white, with a brown band in suture
8 normal whorls 12 x 5.5 mm. Monterey to San Diego .... tincta
.. Shell uniformly white
... Varicose ribs continuous over the very deep sutures
8 normal whorls 20 x 8 mm. Monterey to San Diego .... cooperi Strong
... Varicose ribs sharp. not continuous over the sutures
6 normal whorls 6.5 x 3 mm San Diego .... orcuttiana Dall
. Varicose ribs 13 to 14
.. Varicose ribs broadly reflected over the body of the whorl
... Varicose ribs flattened in the sutures
7 normal whorls 12 x 4.5 mm. Catalina Island ...... catalinae Dall
... Varicose ribs continuous over the sutures
6 whorls (decollated) 9.5 x 5 mm. Puget Sound ..... caamanoi Dall & B.
.. Varicose ribs sharp, only slightly reflected
... Varicose ribs narrowly aculeated at the shoulder
11 whorls 35 x 12 mm. Alaska to Puget Sound .... indianorum Carpenter
... Varicose ribs expanded in to a small lamella at the shoulder
9 normal whorls 20 x 6.5 mm. Monterey to San Diego ... acrostephana
. Varicose ribs 15 to 16
.. Varicose ribs regularly continuous up the spire
10 whorls 17.5 x 4.5 mm. Monterey .... crebricostata
.. Varicose ribs concave at the suture, flattened on the base
12 normal whorls 18 x 7.5 mm. San Pedro to Coronado Island.tabulatum
. Varicosa ribs more than 16
.. Varicose ribs low, sharp, spinose at the shoulder
10.5 x 4 mm. Vancouver to Lower Calif. .... sawinae Dall
.. Varicose ribs sharply angulated to the shoulder
7 normal whorls 9 x 4 mm Pt. Reyes to San Diego ... rega Dall
Varicose ribs rounding over the shoulder without spine or angulation
. Varicose ribs 9 to 11
5 whorls (decollated) 11.5 x 6 mm. San Diego ..... zephryrina Dall
.. Varicose ribs solid, thick, not continuous
6 whorls (decollated) 17 x 7.5 mm. Puget Sound ... denisclathrata Dall
.. Varicose ribs with anterior face flattish, smooth
6 normal whorls 19 x 6.5 mm, San Diego .... barbarina Dall
.. Varicose ribs narrow, rounded, slightly flattened in suture
5 normal whorls 15.5 x 6 mm. San Diego .... presutura Dall
. Varicose ribs 14
.. Varicose ribs low, flattly reflected on the base
6 whorls (decollated) 5.0 x 2.5 mm. Monterey.. regiomontana Dall

(con.)

Varicose ribs without spine or marked angulation
. Varicose ribs 5 to 6
.. Ribs very broadly reflected
7 whorls 19 x 9 mm. Gulf of Fonseca .... strongianum Lowe
.. Ribs strong, wing like
6 whorls 12.5 x mm. Gulf of Nicoya .... dianae Hinds
. Varicose ribs 7 to 8
.. Upper whorls flesh color, lower white
8 whorls 8 x 4 mm. Magdalena Bay .... phanium Dall
.. Shell uniformly white
9 whorls 4.5 x 2.2 mm Bahia Honda, Panama .... gissleri S. & H.
. Varicose ribs 9 to 11
.. Base marginated by a strong cord
7 whorls (decollated) 15 x 7 mm. Panama .... basicum Dall
.. Base not marginated
... Upper whorls lilac, last whorl white
9 whorls (decollated) 9 x 5 mm. Magdalena Bay.. callipheplum Dall
... All whorls white
.... Ribs not continuous up to the spire
7 whorls 3 x 1.5 mm. Panama .... tabogensis Dall
.... Ribs continuous up the spire
..... Ribs sharp, pitting the suture
6 whorls 9 x 4.5 mm. Gulf of Calif. .... colpoicum Dall
..... Ribs low, rounded
10 whorls 9 x 3.5 mm. Panama .... cumingi Carpenter
. Varicose ribs 12 to 14
.. Shell stout, broadly conic
7 whorls 11 x 6 mm Mazatlan ....suprastriatum Carpenter
.. Shell slender, elongate conic
... Ribs not continuous, low, thread like
5 whorls (decollated) 4 x 1.5 mm. La Paz ...... cylindricum Dall
... Ribs continuous
.... Ribs low, closely appressed to the whorls
9 whorls 14 x 4.5 mm. Acapulco .... appressicostatum Dall
.... Ribs stout, smooth
9 whorls 28.5 x 9.5 mm. Montijo Bay..... gaylordianum Lowe
. Varicose ribs 16
.. Whorls well rounded
... Ribs low, rather thick
5 whorls (decollated) 7.5 x 4 mm. Galapagos ... habeli Dall
... Ribs broad, curved
7.5 whorls (decollated) 15.9 x mm. Ecuador.. strongi Bartsch
. Varicose ribs 18 to 22
.. Ribs strongly curved
... 6 whorls (imperfect) 2.3 x 1.5 mm. Panama....... imbrex Dall
.. Ribs not strongly curved
9 whorls 3.2 x 1.6 mm. Corrientes, Mexico ..... willetti S. & H.

Epitonium indianorum (Carpenter),1864	Forrester Island to Puget Sound
Epitonium hexagonum (Sowerby),1844	Santa Cruz to Panama
Epitonium cooperi Strong,1930	San Francisco to Gulf of Calif.
Epitonium tinctum (Carpenter),1864	Monterey to Gulf of Calif.
Epitonium crebricostatum (Carpenter),1864	Vancouver to Gulf of Calif.
Epitonium diegensis (Dall),1917.	San Diego to La Paz
Epitonium californicum (Dall),1917	San Miguel Id. to Gulf of Calif.
Epitonium musidorum (Dall),1917	San Diego to Panama
Epitonium oaamonoi (Dall and Bartsch),1910	Puget Sound to San Diego
Epitonium persuturum (Dall),1917	San Diego

• Varicose ribs 18 to 19
•• Varicose ribs low, rounded, interspaces striated
9 whorls (decollated) 21 x 7.5 mm. Oregon to Lower Calif.. columbiana Dall
• Varicose ribs 20 to 21
•• Varicose ribs narrow, errect
6 whorls 3.25 x 1.6 mm. Monterey ....rectilaminata Dall
•• Varicose ribs smooth, strongly reflected
6 whorls 3.5 x 1.75 mm. Monterey .... berryi Dall

Nitidiscala Lower California to Chile
Varicose ribs with a spine or expanded angle at the shoulder
• Varicose ribs 6
•• Varicose ribs sometimes spined, finely striated
10 normal whorls, 21 x 9.5 mm. Gulf of Calif. .... prehexagonamDall
U.S.N.M. 50:479
•• Varicose ribs strongly angulated, smooth
14 x 6 mm. ? California to Panama ... hexagonamSowerby
Oldroyd 2-2-59
• Varicose ribs 7 to 8
•• White with a flesh colored peripheral band
8 whorls 15 x 10 mm. La Paz to West Mexico ..... bialatum Dall
•• Uniformly white
••• Shell slender, angulation not prominent
8 whorls 11 x 4 mm. Gulf of California .... eutaenium Dall
••• Shell stout
•••• Rib's errect
••••• Ribs flattened on the base
7 whorls 4 x 2 mm. Lower Calif. to Panama ..... apiculatum Dall
••••• Ribs not flattened on the base
•••••• Ribs continuous up the spire
9 whorls 7.2 x 4.4 mm. Bahia Honda, Panama .... wurtsbaughi S. & H.
•••••• Ribs alternating in the suture
10 whorls 26 x 10 mm. Panama .... hindsii Carpenter
• Varicose ribs 9 to 10
•• Ribs spined
••• Spine half way between the suture and periphery
8 whorls 4.5 x 2 mm Gulf of California .... centronium Dall
••• Spine at the shoulder
•••• Shell narrowly umbilicated
10 whorls 8.75 x mm. Central America .... obtusum Sowerby
•••• Shell not umbilicated
••••• Ribs errect
7 whorls (decollated) 20 x 9 mm. La Paz .... pazianum Dall
••••• Ribs reflected
7 whorls 10.5 x 4 mm. Santa Barbara Islands to Gulf.californicum Dall
•• Ribs angulated, not spined
10 whorls 8.75 x mm. Central America .... aciculicum Hinds
• Varicose ribs 11 to 12
•• Shell angulated at the base
5 whorls (decollated) 2.75 x 1.75 mm. Panama ... columnellum Dall
•• Shell not angulated at the base
5 whorls (decollated) 5 x 2 mm. San Diego to Panama..diegensis Dall
• Varicose ribs 13 to 14
•• Ribs low, spined on the early whorls
8 whorls 12 x 6.5 mm/ Pt. Abreojos .... roberti Dall
•• Ribs sharp, a blunt angle at the suture
7 whorls 4 x 2.5 mm. Pt. Abreojos to Gulf ..... compradorum Dall
(con.)

Epitonium densiclathratum (Dall),1917	Puget Sound to San Diego
Epitonium rectilaminatum(Dall),1907	Monterey to Gulf of Calif.
Epitonium regiomontanum (Dall),1917	Monterey
Epitonium sawinae (Dall),1903	Vancouver to Lower Calif.
Epitonium berryi (Dall),1907	Monterey to San Diego
Epitonium inconspicuum (Sowerby),1847	San Diego south
Epitonium columbianum (Dall),1917	Forrester Island to Gulf of Calif.
Epitonium pedroanum Willett,1932	San Pedro
Epitonium callipeplum (Dall)1919	Magdalena Bay
Epitonium phanium (Dall),1919	Magdalena Bay-Montijo Bay
Epitonium apiculatum (Dall),1917.	Lower Calif. to Panama
Epitonium cylindricum (Dall),1917	La Paz
Epitonium basicum (Dall),1917	Gulf of Calif. tp Panama
Epitonium compodorum (Dall),1917	Gulf of Calif.
Epitonium colpoicum (Dall),1917	Gulf of Calif.- Montijo Bay
Epitonium pazinum (Dall),1917	La Paz to Acapulco
Epitonium bialatum (Dall),1917	Gulf of Calif. to Panama
Epitonium prehexagonum (Dall),1917	Gulf of California
Epitonium roberti (Dall),1917	Gulf of California to Central America
Epitonium eutaonium (Dall),1917	Gulf of Calif.
Epitonium centronium (Dall),1917	Gulf of Calif.-
Epitonium willetti Strong & Hertlein	off Mazatlan
Epitonium strongianum Lowe	San Salvador
Epitonium regularis (Carpenter),1856	Acapulco to Panama
Epitonium appressicostatum (Dall),1917	Acapulco
Epitonium cumingi (Carpenter),1856	Panama
Epitonium hindsii (Carpenter),1856	Panama
Epitonium obtusum (Sowerby),1844	Panama
Epitonium columnellum (Dall),1917	Panama
Epitonium imbrex (Dall),1917	Panama
Epitonium thylax (Dall),1917	Panama
Epitonium zeteki (Dall),1917	Panama
Epitonium gaylordianum Lowe	Panama
Epitonium habeli Dall,1917	Galapagos
Epitonium rhytidum (Dall),1917	Galapagos
Epitonium strongi Bartsch,1928	Ecuador
Epitonium reedi Bartsch,1928	Ecuador

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Epitonium indianorum (Carpenter),1864. Forrester Island, Alaska to Todos Santos Bay, Lower Calif. (Dall). Type locality, Neah Bay, Washington

Collecting data: Off Avalon, Catalina Island in 35 fms.; off Redondo Beach in 25 fms. gravel- not common; several local Pleistocene deposits such as Hilltop Quarry, Baldwin Hills,Timm's Point etc. (Burch); Forrester Island and Ketchikan,Alaska (G. Willett); Victoria, B.C. (Lewis)(Willett); 65-71 fms. off Point Pinos (USFC). This seems to be a fairly deep water species at least from Monterey south (A.G. Smith).

Epitonium tinctum (Carpenter),1864. Vancouver,B.C. (Keen) to the Gulf of California. Mr. A.M. Strong,(reference above) places in the synonymy of tinctum, Epitonium fallaciosum (Dall),1917 and Epitonium subcoronatum (Carpenter),1866.

Dr. A. Myra Keen advises to note the correct date of this and the previous species as 1864 not 1865, and also comments on the com on designat-ion of San Pedro,Calif. as the type locality " The type locality of tinctum is ' Lower California and San Diego'. The San Pedro locality could be used only if someone designates the specimen Mr. Strong figured as a lectoholo-type."

(con.)

Mr. Strong states " The species differs from Epitonium indianorum (Carpenter) principally in the smaller size, more robust form, and in the presence of the color band."

Collecting data: This species also seems to be associated with the sea anemones. Mrs. E.P. Chace called attention to the fact that this is a different sea anemone than the one associated with Opalia insculpta and that these small sheet anemones will irritate the skin very much like poison oak. However, when you find a large rock covered with these small anemones you can usually pick out a set of E. tinctum along with the poison. It is a common littoral species in our experience all around Monterey Bay,San Simeon, Cayucos,Morro,Malaga Cove,Palos Verdes,Pt. Vicente,Balboa,Corona del Mar, San Onofre,San Diego on Crystal Pier pilings and in holdfasts at Imperial Beach. We have dredged it as deep as 25 fms. off Redondo Beach (Burch);

Mr. A.G. Smith makes some interesting statements about this species: " As I understand it, Carpenter used the name subcoronatum for the form with the coronate varices. Both the coronate and the non-coronate forms are found at least from Monterey south. I agree with Strong that the form living under the anemones and otherwise off the northern California coast are slightly different and may be worthy of a subspecific name. I have it from several localities from Pt. Reyes north. It never has the varices coronate to any appreciable degree. I doubt if the name subcoronatum is available for it as the type of the latter, with its coronate varices, is not the same thing. Tinctum (typical) and the form subcoronatum are common in Monterey Bay and vicinity from shore to 10 fathoms."

In connection with the point discussed by Mr. Smith, John Q. Burch in the preliminary survey asked the following question ".. do we wish to recognize the slight differences ' heavier and somewhat broader' between typical tinctum and the northern species up to Vancouver,B.C., and if so Mr. Strong suggests that we may use subcoronatum as a subspecies ? However, the consensus of opinion returned on this question is perhaps well stated by Mr. George Willett " No. Many other species are larger in the north" However, there is no doubt at all that they are separable and we would all be pleased to have Mr. Smith describe and figure the northern race.

" Have specimens from Pismo and Cayucos,Calif. to San Martin Island, Lower Calif. (Miss Bristol of the San Diego Museum); common in shallow dredgings in San Diego Bay; common on the breakwater, Coronado; common Mission Bay; (W.K. Emerson);

This species as well as the subspecies following was discussed by Mr. A M. Strong in Nautilus 55:46,47.

Epitonium tinctum bormani Strong,1941. Nautilus 55:46,47

Type locality, associated with sea anemones in Mission Bay,San Diego Co.

The original description follows: ". These shells live in close association with sea anemones in sand pockets and sand filled crevices in the rocks on the outer coast where they are exposed to the wash of the surf. Recently Mr. and Mrs. Bormann of Long Beach, Calif. , collected a large number of specimens of apparently a distinct variety, associated with sea anemones in the quiet waters of Mission Bay, near San Diego. They are smaller than the typical form, with the varices almost entirely lacking the coronation below the sutures and averaging about two more to the whorl. The brown line below the suture is faint but visible in most of the living specimens. These may take the name of Epitonium (Nitidiscala) tinctum var bormanni. The type has been deposited as No. 1064 in the type collection of the Los Angeles County Museum. It has a little more than 7 post-nuclear whorls and 13 varices. The measurements are: length, 7.2 mm.; diameter,4.0,mm.

Epitonium persuturum (Dall),1917. San Diego, Calif.

Epitonium cooperi Strong,1930, Trans. San Diego Soc. Nat. Hist. vol.6, no. 7 p. 194, pl.20, figs. 6a,6b,7,8a,8b, Aug.30,1930.

Mr. Strong places in the synonymy of this species " Scala tincta" as used by Arnold; hindsii as used by Packard; and fallaciosum as used by Jordan. The original description follows:

" Shell of medium size, pure white, thin; apex sharp, with the extreme tipbroken in all the specimens examined; remaining whorls about 8 in the adult, almost semi-circular in outline between the very deep sutures, regularly increasing in size, forming a slender turreted spire; ornamented with 11 or 12 thin varices which touch the varix on the proceeding whorl before reaching the bottom of the suture,but which do not fuse, and ascend the spire in a continuous line approximately parallel with the right side of the shell; varices on the middle and lower portion of the whorls somewhat reflexed, exposing the edges of the layers of cell-structure as faint axial striations, becoming erect and expanded at the shoulder of the whorls where they form coronating points, beyond which they dip concavely into the sutures; on the base the varices continue without change to the raised columellar lip under which they dip; spiral sculpture entirely absent; aperture nearly circular; columellar lip raised, sharp, curved, somewhat expanded at the junction with the basal lip, extending posteriorly to a junction with the outer lip, which is thickened by the last varix."

The type, No. 345, S.D.S.N.H., comes from San Pedro, Calif. and measures, length 20, maximum diameter 8 mm.

The species differs from the other species in the subgenus found on the west coast in the thinness of the shell and the very deep sutures between the loosely coiled whorls."

Range: Vancouver, B.C. south to Lat.23 Dr. A.M. Keen advises " Ranges north to Nanaimo,Vancouver Island, B.C. (Specimens in Oldroyd collection determined by A.M. Strong).

Collecting data: A common species in the dredgings off Redondo Beach in 25 fms. gravel, less common down to as deep as 75 fms. in out experience; taken littoral at San Onofre,Calif.; Anaheim Landing; Punta Banda, L.C.; Newport Bay, Calif.; and in the Estero below Ensenada,Mexico; washed in on Terminal Island; common in Baldwin Hills Pleistocene. (Burch); San Martin Island, Lower Calif. (Baker); La Jolla (Lowe); " A bay mud species. The Monterey record cited by Dall is extremely questionable. Think it lives farther to the south" (A.G. Smith). * Note- while we have never taken it from Monterey or north of Monterey, our experience has been to find it definitely not a bay mud species but with few exceptions on rocky shores of the open sea and even dredged at considerable depths and then always associated with gravel or rock.(Burch).

Epitonium densiclathratum (Dall),1917. Neah Bay, Wash. to San Diego.(Dall). Type locality, Puget Sound.

Collecting data: off Redondo Beach, Calif. in 50 fathoms (Burch);not recorded from Monterey (A.G. Smith).

Epitonium crebricostatum (Carpenter),1864. Vancouver Island to Gulf of Calif. (Dall). Type locality, Monterey, Calif.

This species has long been a series of question marks with west coast collectors. Mr. George Willett suggests " Probably equals indianorum". Mr. A.G. Smith writes " See Strong (1930) on this. Agree with him that it is an extreme variant of tinctum,probably. I have one or two shells from Monterey that might possibly fit the requirements, but as Strong says, until he or someone else fixes a holotype crebricostatum will have to remain as a nomen inquirendum. (There's a $64 term for you.)"

Epitonium hexagonum (Sowerby),1844. Santa Cruz,Calif. to Pahama (Dall). Type locality, Acapulco,Mexico.

There seems to be serious question about the northern record of this species. Mr . A.G. Smith states " The Monterey record is unquestionably erroneous. Shells so labelled or identified from Monterey are properly E. evictum or E. montereyensis, (or both). Hexagonum is southern."

Collecting data: San Pedro, Calif. (G. Willett); specimens from Acapulco to Pacific Beach (Miss Bristol-San Diego Museum);

Epitonium tiara (Carpenter),1856. Catalina Island to Todos Santos Bay, L.C. Panama ? Type locality Panama.

Collecting data: Midspit, San Diego Bay and Ballast Point (Baker); La Jolla (Orcutt); Ocean Beach and Avalon,Catalina Island (Kelsey);

Epitonium columbianum (Dall),1917. Forrester Island, Alaska to Gulf of California. Type locality, off the Columbia River, Oregon.

Collecting data: off Monterey, Calif. in 20 fathoms, shale bottom(Burch); Forrester Island, Alaska in 20 to 40 fathoms (G. Willett); 10-20 fms. off Santa Cruz, rare (Gordon)

Epitonium sawinae (Dall),1903. Barkley Sound, B.C. to Catalina Island,Calif. Type locality, near Avalon, Catalina Island. Dr. Dall figured this species in Bulletin 112 and gave the range from Monterey south, but Dr. Keen called attention to the fact that Dalland Bartsch,1910, p.21 cited E. sawinae from Barkley Sound, B.C.

Mr. A.M. Strong in Trans . San Diego Soc. Nat. Hist. vol.6,pp.194-195, pl.20, figs. 9,10 " The large number of sharp varices makes the species quite distinct among the west coast species in the subgenus".

Mr. Strong places E. catalinensis (Dall),1917 in the synonymy. This is a mooted question though. Some of us have thought we could separate them. Mr. George Willett's note on this problem states it clearly " This is a difficult problem. Specimens taken in 20-40 fms. (San Pedro,Catalina) vary greatly, some shoulders being rounded, others angled and varices numbering from 19-27. This would confirm Mr. Strong's idea. However, 12 specimens taken at 200 fathoms off Catalina all have shoulders rounded and varices are more in number, 25 to 32." Therefore, we will retain E. catalinensis pending further study.

Collecting data for E. sawinae: off Monterey in 10-20 fms. shale; Santa Monica in 15-20 fms.; Redondo Beach, common in gravel at 25 fms. and not uncommon down as deep as 100 fathoms in mudand gravel; Avalon, Catalina Island in 35 fathoms; common Pleistocene fossil in Timm's Point, Baldwin Hills etc. (Burch); Monterey Bay, 10-56 fms., fairly common (A.G. Smith); San Diego from 50 fms. (Baker); Catalina Island in 50 fms. (Lowe)

Epitonium catalinensis (Dall),1917. Catalina Island,Calif.
Discussed above under E. sawinae.

Epitonium pedroanum Willett,1932. Transactions San Diego Soc. Nat. Hist. vol.7, pp.88,89, pl.5, fig.3. Type locality, off San Pedro in 20 fms.

The original description follows:

" Description of type.- Shell small, slender, thin, buffy-white; with ten whorls exclusive of the (lost) nucleus; varices fifteen, very low, slightly reflected, with no perceptible shoulder, and almost encircling the spire; whorlsand base rounded; aperture oval, somewhat angled. Length,11.7; maximum diameter, 3.7.

Type No. 1036, collection of the Los Angeles Museum. The type and another smaller specimen were collected by G. Willett in 20 fathoms off San Pedro, California, September 9,1931. Paratype in the collection of the writer.

This species does not closely resemble any west coast Epitonium known to the writer. The varices are somewhat similar to those of E. columbianum Dall and the unshouldered variety of E. sawinae which Dr. Dall called catalinense. The varices of pedroanum, however, are fewer in number than in either of these species, and the shell is much more slender and of a different color. Furthermore pedroanum is much smaller than columbianum and longer than sawinae."

Epitonium californicum (Dall),1917. Santa Monica and Redondo Beach,Calif (Burch), San Miguel Island south to the Gulf. Type locality, San Miguel Island, Calif.

Mr. A.M. Strong figures a specimen from Alamitos Bay, Los Angeles county, in Trans. San Diego Soc. Nat. Hist. vol.6, p.195,pl.20,figs. 11,12a,12b,1930. Mr. Strong states" This species resembles Epitonium tinctum (Carpenter) in many ways, but differs in the more slender form, fewer and more reflected varices and in the lack of the color band."

Collecting data: off Santa Monica, Calif. in 15 fms.; off Redondo Beach in 25 fms. gravel.(Burch); San Diego (Baker); San Pedro (Lowe);

Epitonium rectilaminatum (Dall),1907. Monterey, Calif. to Gulf of Calif. Type locality, Monterey, Calif.

Collecting data: (See discussion under E. berryi below) - off Redondo Beach, Calif. in 25 fms., gravel (Burch); San Pedro, Calif. in 25 fms. (G. Willett); Monterey Bay, 10-15 fms., fairly common (A.G.Smith).

Epitonium caamanoi (Dall and Bartsch),1910. Ketchilan, Alaska (Willett) to San Pedro, Calif. Type locality, Barkley Sound,Vancouver Island,B.C.

Collecting data: Ketchikan, Alaska in 10 fms. (G. Willett); Olga, Washington (Engberg); no Recent records but have sets from San Pedro Pleistocene (Burch).

Epitonium regiomontanum Dall, in De Boury,1919. De Boury, E. " Etude sur les scalares de la cote Pacifique Americaine, a propos d'un travail de M. Dall", Jour. Conchyl,vol.64, no.1 (Jan.30,1919),pp 33-40.

The explanation for the above name is stated by Dr. A.M. Keen as follows (Per. Comm. Aug.,1945) " Epitonium montereyense Dall,1917 is a rejected homonym and cannot be revived again (Article 36, International Ryles). It is true that the original name combination to the 1907 name is Scala (Cirsotrema) montereyensis, but as Dall in 1917 abandoned Scala in favor of Epitonium, this is tantamount to transferring all species he had named under the former to the latter, and so the second use of E. montereyense is invalid the moment it is put on paper".

We have no collecting records for the species.

Epitonium berryi (Dall),1907. Monterey to San Diego, Calif. Type locality, San Pedro Bay, Calif. in 200 fathoms.

Collecting data: Dr. Dall in the description mentions a set dredged by Dr. S.S. Berry from off Del Monte in 15 fathoms. Our experience has been to dredge it in 10 fms.and also 20 fms. on the shale off Del Monte in Monterey Bay. We also have a set labelled " part of original lot" ? from Mrs. W.H. Eshnaur. (Burch); there is a set in the San Diego Museum labelled Monterey from 12 fathoms' (Berry).

Mr. A.G. Smith discusses this species (Per. Com. Aug. 1945) as foll-

-ows:" Here is a tough one. My information from Berry is that the type came from Monterey in 12 fathoms, and is the only authentic specimen of berryi from Monterey Bay. I believe Dall cited others from southern California. This being the case, the original lot consists of a single specimen, the type; so you could not possibly have " part of the original lot". There must be an error somewhere. Dall just possibly might have lumped shells from more than one locality into a so-called original lot, but if he did this it was certainly bad practice and ought not to stand. Anyway, we think that the standing of berryi is questionable, believing it to be a variant of E. rectilaminatum . Berryi is a tiny species. We have not collected it ."

* Note*- It is our intention to have all specimens involved in such disputes carefully checked by a committee of which we trust Mr. Smith will be a member before arriving at a final conclusion. The purpose of these notes is simply to accumulate as much information as possible to be used as a foundation for further study.(Burch).

Epitonium inconspicuum (Sowerby),1847. Off San Diego in 75 fathoms (Dall). Type locality given as West Indies by both Sowerbyand Reeve.

Epitonium diegense Dall,1917. San Diego, Calif. to the Gulf of California. Type locality not stated in original description but Oldroyd says San Diego.

Subgenus Crisposcala De Boury,1886. Type (by original designation), Scalaria crispa (Lamarck).

There are several things to be determined regarding Crisposcala. In the first place Dr. Dall used it as a Section of Nitidiscala and the question is whether or not it is sufficiently distinct to key out as a subgenus. We then note that our two keys to genera and subgenera differ. Mr. Strong's key " Shell without a basal disk; spiral sculpture distinct; varices forming a ridged fold bounding umbilicus." Dr. A.M. Keen calls attention to the following " According to Durham (Jour. Paleont., vol.11,no.6,1937,p.483), Crisposcala has a basal disk; it is distinguished by a network of crossed spiral lines that produce a decussate appearance on the varices".

Epitonium catalinae (Dall),1908. Forrester Island, Alaska to San Diego, California. Type locality, south side of Catalina Island, Calif.

Collecting data: dredged off Redondo Beach in 75 fms. mudand gravel; off Catalina Island in 35 fms.; not uncommon in Timm's Point, San Pedro, Pleistocene (Burch); Forrester Island, Alaska in 20-40 fms.; San Pedro in 20 fms.; Catalina Island in 40-60 fms. (G.Willett); Prince William Sound, Alaska in 18 fms. (Lewis);(Willett); Monterey Bay, 21 fms. mud, a single specimen (A.G. Smith); 6 specimens (depauperate var.) dredged Santa Barbara Island, Calif. (Lowe in 1909) (San Diego Museum).

Epitonium regum Dall,1917. Point Reyes to San Diego, Calif. (Dall). Type locality, off Point Reyes in 61 fathoms.

Collecting data: off Monterey, Calif. in 15 fms. (Burch); Catalina Island in 40 fms. (G. Willett);

Mr. A.G. Smith comments on the above Monterey record as follows "Your record from Monterey Bay is the first oneand adds a new species to our list. Are you sure of your identification?" * Note*- this was checked by Mr.Willett but will have them rechecked with others before establishing any new records. (Burch).

Epitonium acrostephanus (Dall),1908. Puget Sound (Lat.48, Keen Abridged Check List) south to Coronado Islands. Type locality, Monterey, Calif.

There was a little discussion as to the spelling of the above specific name, the question being is it -us or -um ? Dr. A.M. Keen advises as follows " As it seems to be a noun in apposition, acrostephanus would be correct."

Collecting data: off Monterey, Calif. in 15 fms.; Redondo Beach in 75 fms. mud and gravel; Avalon, Catalina Island in 35 fms.; not uncommon in the Pleistocene of Timm's Point, San Pedro (Burch); So. end San Clemente Island in 40 fms. (Baker); Santa Barbara Island (Lowe); 34-203 fathoms in Monterey Bay, scarce (A.G. Smith); S. Coronado Id. in 15 fms.(Willett).

Epitonium tabulatum Dall,1917. Monterey, Calif. (Burch) to Coronado Islands. Type locality, San Pedro, Calif.

Collecting data: off Monterey in 40 fms.; off Redondo Beach in 25 fms. gravel; not uncommon in the Pleistocene of Timm's Point, San Pedro (Burch); San Pedro (Lowe); San Pedro in 20 fms. and Catalina Island in 30-40 fms. (G. Willett); Monterey Bay, 10-25 fms, scarce. Also 43-44 fms. off Santa Cruz (USFC) (A.G. Smith).

Subgenus Globiscala De Boury,1909. Type (by original designation), Scalaria bullata Sowerby.

" Shell without a basal disk; spiral sculpture very fine or wanting; shell white; shell short and broad; varices thin and errect" (Strong)

Epitonium orcuttianum Dall,1917. San Diego, Calif. Type locality, San Diego Harbor, foot of Broadway, C.R. Orcutt.

Epitonium barbarinum Dall,1919. San Diego, Calif. to Panama Type locality, San Diego, Calif.

Epitonium zephyrium Dall,1917. San Diego, Calif.

Additions and Corrections

The following species should have been included in our list of the species of the subgenus Nitidiscala. The species was not included in Bull. 112 nor is the description in Oldroyd. The description follows:

Epitonium musidora Dall,1917. Proc. USNM, vol.53, no.2217, p.483,1917. Range, San Diego to Panama. U.S. Mus. Cat. No. 201203, but type locality not stated.

" Shell thin, white, slender, with an acute spire and deep suture; varices 10 or 11, low, thin, sharp, slightly reflected, anteriorly smooth, continuing over the suture into which they dip, and making a nearly complete circuit of the spire; base rounded, aperture subovate; there is a slight broadening of the varix at the shoulder of the whorl, but no angulation. Length, 13; diameter, 5 mm. "

Collecting data: San Diego, Calif. (Baker); La Jolla, Calif. (Bristol-identified by Dr. F. Baker).

A.W.B. Powell, Auckland Institute and Museum, Auckland, New Zealand.

Re the interpretation of the Bulla complex, your Minutes #47, pp 20 and 21.

I am sorry to have to disagree with these findings, but one most significant fact has been overlooked by all concerned. Bulla Linnaeus, 1758, as a molluscan name is " stillborn". It appears on p. 725 of the 10th edition as a mollusc, but in the same work 298 pages earlier Bulla was first introduced as a subgenus of crickets, Gryllus (See Finlay & Marwick,1937, N.Z. Geol. Surv. Pol. Bull. 15, p.92).

The well known Atys Montfort,1810 stands (Type, o.d.: Atys cymbulus = Bulla naucum Linn. Synonyms Bulla Linn. 1758, p.725 (not p.427): Bullaria Rafinesque,1815 Subst. name for Bulla Linn. (the mollusc). Bullus Montfort,1810, a mis-spelling for Bulla Linn. (the mollusc).

Regarding the conventional usage of Bulla and Bullaria two names are available, Vesica Swainson,1840 and Quibulla Iredale,1929.

Iredale 1929, p. 349, dismissed Vesica Swainson as preoccupied by Vesica Humphrey,1797. By doing so he purposely ignored opinion 51 of the International Rules which reject the names of Mus. Calonn. The ignoring of these considered opinions of the International Commission is not shared by many workers other than Iredale, so Vesica Swainson 1840 retains status. It was proposed for ampulla and naucum, but Gray 1847 designated ampulla as type. Quibulla Iredale 1929 Type (o.d.) Bulla botanica Hedley is available for the cylindrical acorn-shaped " Bullas" with an open apical umbilicus.

Re your query Vesica quoyi- this was undoubtedly collected in New Zealand by Dr. Stanger, described by Gray in Dieffenbach's N.Z. 1843 and the type well figured by Smith in " Erebus and Terror" Zool. 1874.

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New Publications Received

" Some Notes on the Lifeand Explorations of Hugh Cuming", by William J. Clench, Occasional Papers on Mollusks, Mus. Comp. Zool., Harvard University, July 30,1945, No.3.

This 12 page account of the life of Hugh Cuming is interesting and valuable. The photograph is that of a portly pleasant appearing gentleman.

" Notes on the Family Cardiidae" by Lillian C. Smith. Occasional Papers on Mollusks, Mus. Comp. Zool., Harvard Univ., July 30,1945, No.4.

Several species are discussed, Fulvia bullata Linne, and Fulvia tenuicostata Lamarck from Australia and the East Indies; Acanthocardia spinosa Solander from the Eastern Atlantic; Cardium indicum Lamarck.

However, the most interesting discussion for us is on the genus Lophocardium and the species cumingii Broderip from Colombia and annettae Dall from Lower California.

" Mollusca", vol.1, no.6, Aug.10,1945. Among other papers of interest in this issue is one by Dr. Harold A. Rehder on " The Measurement of Shells". This paper is well figured and worth while. " Further Notes on Schistomiasis" by Dr. Henry Van Der Schalie. " Conservation" by Dr. B.R. Bales.

Mollusca is published by Paul H. Reed, Tavares,Fla. $2.50 per year.

" Proceedings of the Malacological Society of London", vol.26, parts 4 and 5, 25 July,1945. There are several exceptionally valuable papers in this issue. The papers contained are: Book Notes by J.R. le B. Tomlin; On two species of Aglaja from the Andaman Islands by K.M. White; On the family Amphibolidae by B. Hubendick; The Living mollusc-II. How it works by A.T. Hopwood; Scandanavian Succineids and their distribution by N. Hj. Odhner; the Boltonian genera by R. Winckworth.

The Winckworth paper gives the types, references and other data on the Boltenian genera and will without a doubt be frequently quoted. We have been in great need of such a paper.

" The Australian Tertiary Mollusca of the Family Turridae" by A.W. B. Powell from Rec. Auck. Inst. vol.3, no.1, pp 1-68, 20th Sept.,19444

This beautifully figured work reminds us of the really great work by Powell on the New Zealand Turridae in 1942. They should serve as an inspiration to some student to attempt a similar work for the fauna of this coast.

" Biological Primary Types in the Auckland Museum" by A.W.B. Powell, Rec. of the Auck. Inst. & Mus. vol.2, no.5,June,1941.

" The Mollusca of Stewart Island" by A.W.B. Powell, Rec. Auck. Inst. Mus. vol.2, no.4, pp 211-238, Oct. 1939..

" The Paryphantidae of New Zealand No.IV and The Genus Placostylus in New Zealand" by A.W.B. Powell from Rec. Auck. Inst. Mus. vol.2, no.3, pp. 133-150, Nov.,1938.

" A Pliocene Molluscan Faunule from Castle Point" " Additions to the Recent Molluscan Fauna of New Zealand" by A.W.B. Powell, from Rec. Auck. Inst. Mus. vol.2, no.3, pp. 157-170, Nov.,1938..

" New Species of Nudibranchiate Mollusca from Auckland Waters" by A.W.B. Powell, from Rec. Auck. Inst. Mus. vol.2, no.2, pp. 119-124,Dec.,1937.

" Discovery Reports" Vol. XV, pp 153-222, Pls. XLV-LVI, New Species of Marine Mollusca from New Zealand" by A.W.B. Powell, Cambridge University Press.

" Tertiary Mollusca from Motutara, West Coast Auckland" by A.W.B. Powell, Rec. Auck. Inst. Mus. vol.1,no.6, pp. 327-340, Sept.,1935.

" Upper Pliocene Fossils from Cape Runaway" by A.W.B. Powell from Rec. Auck. Inst. Mus. vol.1, no.5, pp 261-274, July,1934.

" Notes on the Importance of Recent Animal Ecology as a Basis of Paleontology" by A.W.B. Powell, reprinted from Proc. of the Sixth Pacific Science Congress,1939.

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Miss Viola S. Bristol, Curator of Mollusks, Natural History Museum, San Diego recently sent the editor the following note " I noted that Mr. Willett thinks Psophidea ovalis from Hawk Inlet, Alaska, collected by Mrs. Kate Stephens, should be checked. I wonder why ? We have one specimen abd Mrs. Stephens has two or three that she collected there in 1907. I was at her home recently and saw many of her Alaskan specimens, all of which, she told me, were identified by Dr. Dall. She has all of her specimens mounted on cards and marked in red ink " Identified by Dr. Dall"

* Note*- Mr. Willett collected extensively in Alaska and one of his theories was that Dr. Dall and others were in error in identifying ovalis from the north. Mr. Willett thought that lordi and ovalis are two very distinct species with ovalis ranging no farther north than California. Of course, Grant and Gale and others have claimed that there is but one species on the coast. The editor has been disposed to agree with Mr. Willett's view and it will be interesting to study the northern ovalis when occasion permits.

Mr. Ernest N. Wilcox, 1738 Johnson Ave., San Luis Obispo, Calif. is our only member in San Luis Obispo County and he has collected extensively both north and south of Morro Bay. The following letter is of great interest to us in our distributional work.

" Enclosed is the list of localities you asked for, and I am very glad to make this small contribution to data. Morro Bay is an interesting field for collecting as it seems to be a meeting place for species from both north and south.

From South	From North
Chione fluctifraga (Sowerby)	Siliqua patula (Dixon)
Volsella capax (Conrad)	Volsella recta flabellata (Gould)
Donax gouldii Dall	Saxidomus nuttali Conrad
Tagelus californianus (Conrad)	Panope generosa Gould
Sanguinolaria nuttallii(Conrad)	Astraea indequale Martyn
Forreria belcheri (Hinds)	Tegula montereyi (Kiener)
Pterynotus festivus (Hinds)	Tegula pulligo (Martyn)
Vesica gouldiana (Pilsbry)	Mitra montereyi Berry

At present there isn't much collecting except at the Bay's south end.

Marine Shells Collected in San Luis Obispo County, Calif. by E.N.Wilcox

Epitonium indianorum (Carpenter)- Cayucos,Cambria

Epitonium tinctum (Carpenter)- Cayucos,Shell Beach,Hazzard Canyon

Zonaria spadicea (Swainson) - Cambria, 1 specimen (Said to have been common at Shell Beach 40 years ago.)

Trivia californiana Gray-Cambria,Cayucos,Shell Beach,Hazzard Canyon

Erato vitellina Hinds- Cambria,San Simeon,Shell Beach,Cayucos

Cerithidea californica (Haldeman)- Very common south end of Morro Bay.

Aletes squamigerous Carpenter- San Simeon,Cambria,Cayucos,Shell Beach

Turritella cooperi Carpenter- Cayucos (1 specimen)

Litorina planaxis Philippi-Shell Beach,Avila breakwater,Shell Beach

Litorina scutulata Gould- Cambria,Shell Beach

Lacuna porrecta Carpenter- San Simeon

Crepidula onyx Sowerby- Morro Bay (often piled deep on Volsella)

Crepidula excavata Broderip- San Simeon, Cambria

Crepidula aculeata Gmelin- Cayucos,San Simeon,Cambria,Hazzard Canyon

Crepidula nummarius Gould- Cambria

Crepidula lingulata Gould- Cambria

Polinices lewisii Gould- Morro Bay

Polinices alta Dall- Morro Bay

Sinum debile Gould- Pismo Beach (Coll. by Harry Kerwin)

Acmaea mitra Eschscholtz- Avila,Cayucos,San Simeon,Cambria,Hazzard Canyon

Acmaea pelta Eschscholtz- San Simeon, Cambria

Acmaea patina Eschscholtz- San Simeon, Cambria

Acmaea digitalis Eschscholtz- Morro Rock,Cambria,Cayucos

Acmaea scabra Gould- Shell Beach,Cambria,Cayucos

Acmaea limatula Carpenter- Cambria,San Simeon

Acmaea asmi Middendorff- Cambria

Acmaea insessa Hinds- Cambria

Acmaea instabilis Gould- Cayucos

Acmaea paleacea Gould- San Simeon

Acmaea triangularis Carpenter- Shell Beach

Lottia gigantea Gray- San Simeon, Cambria

Tricolia compta(Gould)- Shell Beach

Astraea undosa Wood- A beautiful specimen collected off Pt. Buchon by Beck Brothers of Oceano.

Astraea inaequale Martyn- San Simeon,Cambria,Haxxard Canyon

(con.)

Homalopoma carpenteri (Pilsbry) -Shell Beach, Cambria
Tegula funebralis (A. Adams) - San Simeon, Cambria
Tegula brunnea (Philippi)- San Simeon, Cambria
Tegula montereyi (Kiener)- Morro Rock
Tegula pulligo (Martyn)- Morro Rock
Calliostoma costatum (Martyn)- Avila,Shell Beach, Morro Bay
Calliostoma annulatum (Martyn)- Cayucos
Calliostoma gemmulatum (Carpenter)- Shell Beach, Cambria
Calliostoma canaliculatum (Martyn)- Morro Bay (2 living specimens)
Calliostoma tricolor (Gabb)- Shell Beach
Calliostoma splendens (Carpenter)- Shell Beach
Calliostoma gloriosum Dall- Shell Beach
Calliostoma supragranosum (Carpenter)- Shell Beach
Haliotis cracherodii Leach- Cambria, Cayucos
Haliotis rufescens Swainson- Cambria, Cayucos
Haliotis assimilis Dall- Shell Beach, Hazzard Canyon
Fissurella volcano Reeve- Cayucos, Cambria
Megatebennus bimaculatus Dall- Cayucos, Cambria
Diadora aspera (Eschscholtz)- Cayucos,Cambria
Diadora murina Dall- Cambria
Lepidochitona lineata Wood- Cayucos
Lepidochitona hartwegii Carpenter- Cayucos, Shell Beach
Nuttallina californica Reeve- Cayucos,Morro Rock, Cambria
Mopalia muscosa Gould- Cayucos,Morro Rock,Cambria
Mopalia lignosa Gould- Cambria
Mopalia ciliata Sowerby- Shell Beach, Cambria
Ischnochiton fallax Carpenter- Cayucos,Cambria
Ischnochiton magdalensis Hinds- Cayucos,Cambria
Ischnochiton mertensii Middendorff- Cayucos,Cambria
Ischnochiton regularis Carpenter- Piedra Blanca,Cambria
Cryptochiton stelleri Middendorff- Cambria,Avila,

* Note*- Several of these species establish new range records. Chione fluctifraga north from San Pedro; Volsella capax north from Santa Barbara; Sanguinolaria nuttallii north from Mugu; Forreria belcheri north from Mugu; Pterynotus festivus and Vesica gouldiana north to Morro Bay.

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Mrs. E.W. Boerstler,P.O. Box 494,Corona del Mar, Calif. We are sorry to have missed Mrs. Boerstler on her recent call. She is an active collector and exchanges with word wide correspondents. On her return from the proposed trip to Guaymas, Mexico soon after the first of the year these exchange correspondents should be getting some nice shells.

Mrs. Mary Bormann,4331 Vermont St.,Long Beach 4, Calif. has just written a nice bit of news about two of our members. Miss Anna J. Tripp formerly of 82 Giralda Walk, Long Beach and Ensign Ralph B. Bormann Jr. are now married. Ensign Bormann graduated from Columbia University, N.Y. and received his commission as Ensign on August 23. They were married the same day at the Riverside Church. Ensign and Mrs. Bormann are coming home on leave the coming week. They have 18 days from the 23rd following which Ensign Bormann will go to San Francisco to report for sea duty.

Pfc. Walter C. Caldwell 14082830, 397th Bomb Sqdn.(H), A.P.O. # 838 c/o P.M., New Orleans, Louisiana. " I am now stationed in Panama and hope to be able to do some collecting while I am here. Would appreciate your sending the Minutes to the above address in the future and will be glad to hear from anyone interested in the marine shells of this region. "

* Note*- Permit the editor to suggest right here that he is one of those " interested".

Anthony D'attilio, 102 Hilltop Acres, Yonkers, N.Y. We are very glad to welcome Mr. D'Attilio to our shell circle. He writes " I notice that most of the members wish to exchange shells. Well in my case though I have an extensive collection of world wide shells, I don't have anything like a large series of duplicates. Several years a go you published lists of rare and dredged material for sale. Will you be doing this again? In any case I would like to know of any such dredged shells for sale."

* Note*- It is true that while we were dredging actively before the war we did sell some of the excess material in order to help defray the expenses of what we found to be anything but an inexpensive pursuit. However, it has been several years since we did any dredging and when we do resume our work in this line it is doubtful if we will resume the role of shell merchants. However, when we do again get to dredging our friends should all do well enough.

University of Illinois Library, Urbana, Illinois- We are pleased to add this great institution to our list of correspondents and have sent them a file of all of our available back issues.

San Jose State College, San Jose 14, California- We are glad to add this fine California institution to our mailing list.

Laura G. Snyder, 1345 S. Clifton, Wichita, Kansas. Miss Snyder is interested in buying fine shells and has in the past made some rather extensive purchases. She is particularly interested at this time in material from the south Pacific and especially Tridacna and Isocardia.

Perhaps some of our members will be interested in writing her.

E.J. Post, 609 W. Emma St., Tampa 3, Florida- We were happy to have a nice letter from our long time member Post. And he sent a box of shells which arrived in good order. Mr. Post comments on the shells " I found these specimens of Pomacea paludosa Say in a fish pond at the Tampa water works. They were laying their eggs all over the concrete wall above the water. Some were 2 or 3 feet above the water. There were at least 50 eggs in a mass. They looked like fish eggs and about the same size, but each egg had a regular shell but they were very thin, about as thick as an onion skin. I took one home and it laid about 75 eggs and they hatched in 30 days. The Physella pomilis arionus Clench from Tampa, Fla. are for Dr. Gregg. The Olivella mutica Say are for you. The reason I am sending them is that it is quite rare to find pure black ones. They are most always nearly white or striped. They have changed the name of them also. Clench says that mutica belongs to the Bahamas. I have been trying for some time to get them off to you, but my health has been very poor. We have had 40 inches of rain this year. We had 33 inches from June 15 to the first of August."

Mrs. Ida Worthy, R.D. Patunahoe, Auckland, New Zealand. We are very glad to have a long friendly letter from our correspondent on the other side. Many fine shells in our collection bear her labels and we are happy to learn that we have a box of New Zealand shells in the mails. It seems that our cousins in New Zealand are a little ahead of us on the reconversion with the shell collecting. Most of us seem to be unable to realize that it really is again possible to take off on a shell excursion.

Mrs. Leonie Woollacott, c/o Charlie Messenger, Beach Rd., Edgecliff, Sydney, N.S.W., Australia. We are interested to learn of the club and that they now have a study night as well as the usual lectures. A few excerpts from her interesting letter follow. " Tom Iredale is preparing an additional N.S.W. list, but I do not know when it will be published. The Australian Zoologist contains some good articles from time to time, but I should think you would get this regularly. If you are interested in land mollusca, I will see if Tom Iredale's illustrated booklets are available. "

Additions and Corrections

Minutes # 51, pp 3-10 covered the family Nassariidae. The following letter has been received from Lillian C. Smith, Museum of Comparative Zoology, at Harvard College.

" I was particularly interested in your discussion of Nassarius, since I had recently spent some time on that tangle of names and species.

If you use the name Nassarius and consider it a substitute name for Nassa Lamarck, should it not have the same genotype, namely Buccinum mutabile Linne'. Woodring so states, p. 264.

Also one other question. Does this name not date from Froriep 1806 ? I have not seen the Froriep translation, but we do have Iredale's word for it. As I understand it, Duméril used the word nassarius but it was not until Froriep combined a species with it that it could be called a proper generic description.

You will find that Thiele, p. 322, includes Nassarius Froriep in the synonymy of Nassa Lamarck, which he considers valid. He used arcularia Linne' as the type of Nassa s.g. and section, however. He cited mutabilis Linne' as the type of the s.g. Sphaeronassa Locard 1886.

I shall be interested to hear other opinions about the genus Nassarius.

P.S. Is Nummarius p.5 a simple misprint? Does this constitute publication of a new genus ? "

* Note* Regarding the P.S. the answer is yes. Please change the first two species on #51 p 5 to Nummarius. Editor. It could not be publication of a new generic name under International Rules, Article 25 (3).

The above letter was submitted to Dr. A. Myra Keen of Stanford University and the following letter is the result.

" As Mrs. Smith is a person who has a disturbing habit of being right when she poses a query, I have gone into the Nassa-Nassarius problem again. On the basis of a photostatic copy of the Froriep translation, I had adopted solution 3 of the discussion below, but now I am inclined to accept Mrs. Smith's conclusion -- solution 2.

First, as the works in question are rare, a brief word as to their content (for a fuller review, see Iredale, Proc. Malac. Soc. London, vol . 12,1916,pp. 79-84): Duméril's " Zoologie Analytique.." appeared late in 1805 or early in 1806. It consisted in the main of synoptical tables in which generic names were used only incidentally, as " Les nassiers (nassarius)." Late in 1806 a German translation of Dumérils work by Froriep appeared. In this work species were cited as " 6. Die Nassaschnecke (nassarius) bewirken durch die hervorragende Basis ihres um die Spindel des Gehauses bewegten Fusses, eine Vertiefung, der Hauptcharacker der Schaale ist. Der breite Fuss ist vorn wie gestutzt, ragt aber weiter als der Kopf hervor. Z.B. Buccinum arcularia L."

There are three alternatives, as I see it:

1. Reject all of the names on the ground that being written with a small initial letter they are not available nomenclaturally under a strict interpretation of Article 8 of the International Rules. A somewhat analagous situation is discussed in Opinions 182 and 183, just issued, in which the decision is reached that names proposed in the plural or in a case other than nominative are to be rejected. I believe that such an action would raise more problems than it would solve,however; we should probably have to adopt Nassaria Link , which has been used in a widely different sense.

2. Regard Duméril's names as emendations of Lamarckian and Linnaean genera. So far as the text proper, especially the Froriep translation, is concerned there is no evidence for this interpretation, but Iredale points out that

in the introduction to his work Duméril cites Lamarck,Poli, and Cuvier and credits them, especially the latter, with revising the classification of Linne! Therefore, we would seem to be justified in considering his names as emendations; they are thus strictly analagous to the Achatinus Montfort,1810, rejected in Opinion 120 as an emendation of Achatina Lamarck 1799. A recently published Opinion, Opinion 148, establishes as a general principle that " A generic name published as an emendation of an earlier name of the same origin and meaning is to be rejected as a synonym of the earlier name, and the type of the genus bearing the emended name is automatically the same species as the type of the genus bearing the earlier name so proposed to be emended... A generic name is to be rejected as a homonym if it has previously been published as an emendation of another generic name of earlier date." Therefore, Nassarius Duméril , must take the type Buccinum mutabile Linne', and Nassarius Froriep becomes a homonym. 3. Regard Duméril's names as genera without species , and consider that the first species cited later should be type. In view of the reiteration of the International Commission of the principles concerning emendations, and in view of the evidence submitted by Iredale, I retreat from my previous adoption of this solution.

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In connection with the above the treatment given it by Winckworth, Boltenian Genera, Proc. Malac. Soc. London, vol.26, p.141,July,1945.

" Nassa,132. Type, designated by Dall 1909, N. picta R.- Buccinum coronatum Gmelin,1791 - Buccinum sertum Bruguiere,1789. Iopas H. & A. Adams,1853, is a synonym. This antedates Nassa Lamarck,1799, type Buccinum mutabile L. 1758, for which Nassarius Duméril,1806 is available."

This matter seems to be running close to the Purpura perenniel dispute. And Purpura is certainly not neglected by Winckworth in this paper. Winckworth follows many others in refusing to acknowledge Purpura Martyn 1784 on the ground that Martyn cannot be regarded as strictly binary. We have published several articles on the Martyn names in our Minutes. We have naturally beendisposed to favor retaining Purpura Martyn because the type is our own well known foliata. However, Winckworth is probably correct in his conclusions, but if he is and Purpura is given the type P. persica (L.)- Buccinum persicum L. 1758 , this is an entirely different group and we must find another generic name for our California species. The most startling thing about Winckworth's conclusions though if I understand them is that if accepted we will be using the generic name Purpura for the species we now place under Thais.

There are a number of other discussions in this paper of great interest to us also. We will discuss them in time.

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The following collecting records were received from Mr. W.J. Eyerdam after our paper was written.

Opalia wroblewskii Morch,1876. Drier Bay, Knight Id., Pr. Wm. Snd.,Alaska 1923-10 fms. mud. This is an extension of range northward from Forrester Island.

Epitonium greenlandicamPerry,1811. False Pass, Unimak Id., Aleutian Ids. (Eyerdam 1932), also Sitkalidak Id. 1931.

Epitonium indianorum (Carpenter),1864, Strait of Fuca.

Family Janthinidae

Genus Janthina Roeding,1798. Type by tautonymy, J. violacea R. - Helix Janthina L. 1758. Janthina Lamarck,1799, is identical. Fide Winckworth, Proc. Mal. Soc. Lon. vol.26,p.140,1945.

There has been some difference of opinion regarding the correct spelling , some authors having used I instead of J. Dr. Joshua L. Baily Jr. calls attention to some of the data surrounding the name," The name Janthina was originally used by Linnaeus as a specific name. He called it Helix janthina. It was first used as a genus by Bolten. We do not have a photostatic copy of Bolten here, but we do have a copy of the Index to Bolten published in Smithsonian Miscellaneous Collections. In this work it appears that Bolten sometimes spelled the name with a J and sometimes with an I. The species which he assigned to each one are not identical, which makes me think he may have intended to have two separate genera. This is so unlikely however that I believe it will be necessary to consider such matters as page priority etc. to decide the correct spelling. U.S. Grant at the U.C.L.A. has a photostatic copy of Bolten, and it would be wise for you to write him, inquiring how he spells it. I have not consulted the original , and I mention this matter only to show you that here is a point that should be looked up."

However, it is apparent that the great majority of recent writers have been using the J.

Thiele in " Handbuch der Syst. Weich.",1929 uses a number of different subgenera- p.225. However, the consensus of opinion seems to be that these subgeneric names have little or no value and here at least we propose to ignore them.

There has been a great deal of confusion with the species of this group from our coast. The result is that identical shells bear a number of different labels in collections.

Janthina bifida Reeve,1858. Conch. Icon. vol. 11, Ianthina, pl. 5, fig. 25 a-b. Type loc.: Pacific Ocean (Sandwich Islands).

This is the name in general use for the species originally listed as Janthina exigua Lamarck,1822 by Dall in Bull. 112. Dr. Dall gave the name bifida Nuttall in his Additions and Emendations to Bull. 112, vol.63, art.10, p.3. Here Dall gives the reference Jay Cat. p.68,1839. However, Dr. A. Myra Keen advises on this " The Jay citation is a nomen nudum. It says, " J. bifida Nuttall. Wahoe." Dr. Keen also sent us the original description as follows:

" Original description (Latin not transcribed here): " Shell turbinated, spire acuminately conic, whorls rounded, rather narrow, concentrically densely lamellately striated, striae very obliquely sinuated in the middle; deep-violet; columella thinly reflected, arched; aperture small, enormously notched..The densely set lamellar striae are less conspicupusly wrinkled in this species than in its cogener I. exigua. Its principal characteristic is the enormous notch in the aperture, which gives the lip a bifid structure."

Dr. Joshua L. Baily Jr. comments on this species as follows (Per. Comm. Aug.,1945) " The species which we formerly called J. exigua is something else. I have seen the specimens in your collection from New Zealand and from Florida, and I agree with you that they are quite distinct from our species, as well as from each other. The name bifida is the next oldest name, but there is some doubt in my mind as to whether we can use it. You give the authority for this name as Nuttall in Jay's Catalog... but I think it more likely that Reeve made a mistake in giving this reference, and that Dall and you both followed Reeve. Also Tryon credits the species to Nuttall, but does not mention Jay. Mrs. Williamson credits the name to Totten. If poss-

-ible you should locate someone who has access to Tottenand see what he has to say about it. Keep, in West Coast Shells, first edition, gives Nuttall as authority for the name *trifida,* which he uses, and Mrs. Williamson also gives the name *trifida.* It is not impossible that we may find that the Florida form is *J. exigua,* the New Zealand form *J. bifida,* and the California form *J. trifida.* This is another matter on which I cannot speak authoritatively but which needs further investigation. ... Finally, converning your statement that *J. trifida* , if that is its correct name, from San Diego looks different from the same species from Los Angeles County, I have no comments. They look the same to me."

Collecting data: We have collected a few of these at odd times at many points along the coast from Pacific Grove south to Mission Beach. The biggest catch we ever made though was at Hermosa Beach, Calif. duringa furious wind storm. Mrs. John Q. Burch did the collecting, the other members of the family being away. An interesting note was the washingashore of deal specimens of Catalina Island land snails along with the *Janthina.* There is a saying that they are only washed in following three days of heavy in shore winds. (Burch); Occasional at Monterey. They came a shore thick a number of years a go at the entrance to Bodega Bay, which I believe is a new northern record. Used to call it *exigua,* which is apparently another species; (A.G. Smith); Have specimens from numerous places along the coast, also Hawaii and the Kermadecs (Miss V. Bristol, San Diego Museum).

Range: Bodega Bay (Smith) to west Mexico. Pelagic.

Janthina globosa Swainson,1822. Puget Sound to Gulf of California. *Pelagic.* Dr. A.M. Keen advises " The type locality of *J. globosa* was not given by Swainson.

Collecting data: Dr. Joshua L. Baily Jr. advises (Per. Comm. Aug. 45) " The species from our coast that has been called *J. globosa* is to my mind indistinguishable in every way from *J. globosa* from *Florida* except in being smaller. However, there are big specimens from Baja California that are typical *J. globosa,* and this species can safely be included in our fauna."; " The late Mrs. Fackenthall collected a few specimens of this at Monterey. Theyare in her collection still, I believe" (A.G. Smith); 15 specimensand dried floats washed a shore at San Diego (Gander); Lower Calif. and Gulf (Dr. F. Baker); Tres Marias Islands and Manzanillo,Mex. (Lowe);

Janthina janthina Linnaeus,1767. San Diego southward. World wide.
Synonymy: *J. caeruleata* Reeve, *J. fragilis* Lamarck, *J. communis* Lamarck etc.

Dr. Joshua L. Baily Jr. discusses this species (Per. Comm. Aug. 45) " The third species found on this coast which Dall called *J. ceruleata* looks to me like the typical *J. janthina* which is the same as *J. fragilis.* It is apparently very rare in *California,* the only collections I know in which it is represented are those of S.S. Berry and Maxwell Smith. Both of their specimens a re depressed,and look more like Reeve's figure of *J. planospira* than any of the others. But knowing how variable the elevation of the spire of this species in Florida can be, I believe you are safe in calling this *J. janthina,* and putting the other names in synonymy."

Dr. A. Myra Keen advises (Per. Comm. Aug. 45) " *J. ceruleata* is a misspelling. It should be *J. caeruleata.* The type locality is not San Diego. Reeve said, " Hab. ---?" Reeve's illustration is no more informative than his description,and I do not know what basis Dr. Dall had for reporting the species from San Diego."

Miss Viola Bristol of the San Diego Museum reports " Our specimens so named and aside from Florida, we have them from: Tres Marias Islands, Mex. (Lowe); San Ignacio Island, W. Mexico (Lowe); Manzanillo (Lowe); Hawaiian Islands etc."

Mr. A.G. Smith contributes an interesting note on this genus as follows: *Janthina* (sp.?)- My niece found a single specimen of a small bicolored species, not referable to either of the above. I have the shell but can't name it. It came from near Bodega Bay.

And in leaving this genus the following comments by Dr. Joshua L. Baily Jr. are of interest (Per. Comm. Aug. 1945) " There are two other matters that need investigation in this genus. It is a well known fact that the axis of the nepionic whorls of this genus is not in line with the axis of the adult whorls. In *J. trifida* the nucleus is tilted at a slight but distinct angle, but in *J. janthina* it is at right angles to that of the later formed whorls. Somewhere I have read that the nucleus is sinistral. I have gone through all my own books to find where I read that, but have not been able to locate the citation. If you can find out where that statement was made I would greatly appreciate being told about it. Also I would like to suggest that California collectors be on the lookout for specimens containing the eggs so that a microscopic examination of the embryos might be made.

The other matter concerns the gills. Every illustration of *Janthina* that I have ever seen shows very distinctly two rows of pectinations. This means that either there is a single bipectinate gill or a pair of monopectinate gills. In either case this is in conflict with the taxonomic position of *Janthina* in the Monotocardia, which have only a single monopectinate gill. I would suggest that collectors examine the gills of these animals to see if they are paired. If so, a serious alteration of taxonomy seems to be needed."

Genus Reclusia Petit De La Saussaye,1853.

This genus has never been reported from California but the following two species are known from the southern fauna.

Recluzia rollandiana Grdy (Gulf of California)

Recluzia insignis Pilsbry and Lowe,1932 (Acapulco to Panama).

Family EULIMIDAE (MELANELLIDAE)

The most important reference to give on this group is " Monograph of West American Melanellid Mollusks" by Paul Bartsch, Proc. U.N. Natl. Mus. no.2207, vol.53, pp 295-356, pls. 34-49,1917. However, there will be some important changes in nomenclature based largely upon the paper by Winckworth, R., Journal of Conchology, vol. 20, no.1, pp. 12-13, May,1934. Winckworth's conclusions have been very generally accepted and were followed by Dr. A.M. Keen ,1943, Trans. San Diego Soc. vol.10, no.2, p.43 as well as by other recent authors.

Dr. A.M. Keen advises (Per. Comm.) " Among authors following Winckworth is Keen,1943. I concluded that *Eulima* is the name for the elongate forms now known as *Strombiformis* and *Balcis* the name for Melanella Auct. Flexing of shells seems so variable I did not try to take it into account. Possibly one might use the subgenus *Vitreolina* Monterosato,1884. Type (fide Winckworth,1932, Jour. Conch. vol.19, p.225), *Eulima incurva* Bucquoy, Dautzenberg, and Dollfus."

Dr. Joshua L. Baily Jr. agrees (Per. Comm. Aug. 1945) " Finally, I agree with you that the shells which we formerly called *Eulima* will now have to be called *Balcis.* I do not know whay the name *Eulima* should be transferred to what we used to call *Strombiformis,* but I presume it must be the result of the discovery of an earlier type designation. Other people have reached the same conclusion and it is probably correct. Since the name *Eulima* is restored to good standing, even though another genus the family must be called Eulimidae. The name Balcis will then be used for both the straight and the flexed shells of what was Eulima. The distinction is of small importance, as a subgeneric name is not needed."

Genus Balcis Leach in Gray,1847. Type (by monotypy): Balcis montagui Leach in Gray = Strombiformis albus Da Costa,1778.

" The genus as here constituted embraces the white polished mollusks that have the last whorl produced and the inner lip appressed for its entire length, or at least for the greater part of its length, to the attenuated base. The shells may be straight or flexed." (Bartsch for Melanella, 1917).

We will first give a key to species and list from Mr. A.M. Strong's notebook and then take up a detailed discussion of the species reported north of San Diego.

Balcis

Shell straight
. Shell 5 mm. or more in length
.. Periphery more or less angulated
... Outer lip protracted in the middle Pt. Hipolito ... baldra Bartsch
Proc. USNM 53, p. 334, pl.37, fig. 2
... Outer lip not protracted in the middle
.... All whorls slightly rounded Galapagos .... ochsneri Bartsch
Proc. USNM,53, p. 305, pl. 31, figs. 1, ,
.... Lower whorls flattened Lower Calif. .... oldroydi Bartsch
Proc. USNM 53, p. 309, pl.36, pl. 5,6,7.
.. Periphery rounded
... Shell broadly conic
.... Shell about 20 mm. in length Gulf of Calif. .... dalli Bartsch
Proc. USNM 53, p. 302, pl.35, fig.5
.... Shell about 7 mm in length Gulf of Calif. .... compacta Carpenter
Proc. USNM, #.53, p. 314, pl.37, fig.3
... Shell elongate conic
.... All whorls rounded
..... Microscopic sculpture distinct Pt. Abreojos ....hemphilli Bartsch
Proc. USNM, 53, p. 313, pl.37, fig.6
..... Microsculpture indistinct Panama .... clodia de Folin
Proc. USNM 53, p. 318, pl.39, fig.1
.... Lower whorls flattened
..... Shell exceedingly slender
...... Shell 10 mm. or more in length Panama ..... recta C.B. Adams
Proc. USNM 53, p. 311, pl.39, fig.3
...... Shell about 7 mm in length Lower Calif. ....rutila Carpenter
Proc. USNM 53, p. 306, pl.35, fig. 2,3,6
..... Shell not exceedingly slender
...... Shell about 12 mm. in length Lower Calif. .... micans Carpenter
Proc. USNM 53, p. 303, pl. 34, fig. 1,6
...... Shell about 6 mm. in length Gulf of Calif. .... mexicana Bartsch
Proc. USNM 53, p. 315, pl.37, fig.5
. Shell less than 5 mm. in length
.. Periphery more or less angulated
... Base very short Panama .... panamensis Bartsch
Proc. USNM 53, p. 311, pl.36, fig.1
... Base moderately long
.... Shell rather stout Gulf of Calif. .... retexta Carpenter
Proc. USNM, p. 311, pl. 38, fig.1

(con.)

.... Shell very slender Gulf of Calif. .... *linearis* Carpenter

Proc. USNM 53, p. 310, pl.36, fig.4

.. Periphery rounded

... Shell broadly conic Gulf of Calif. .... *producta* Carpenter

Proc. USNM 53, p. 318, pl.39, fig.5

....Shell elongate conic

....Shell not exceedingly slender

..... Periphery of last whorl inflated Panama .... *solitaria* C.B. Adams

Proc. USNM, p.308, pl.35, fig.4

..... Periphery of last whorl not inflated

...... All whorls rounded Pt. Abreojos .... *abreojosensis* Bartsch

Proc. USNM 53, p. 316, pl.40, fig 4

...... Lower whorls flattened Ecuador .... *olssoni* Bartsch

Proc. USNM 66, p.8, pl.2, fig.4

Shell flexed

. Shell 5 mm. or more in length

.. Shell flexed in a single direction

... Periphery more or less angulated Sansonata,Mexico.. *bipartita* Morch

Proc. USNM 53, p.331, no fig.

... Periphery rounded

.... Shell broadly conic Lower Calif. .... *thersites* Carp.

Proc. USNM 53, p. 323, pl.41, figs. 1,2,3

.... Shell elongate conic Lower Calif. .... *peninsularis* Bartsch

Proc. USNM 53, p. 320, pl.39, fig.4

.. Shell flexed in two directions

... Periphery more or less angulated

.... Shell exceedingly slender Lower Calif. ....*catalinensis* Bartsch

Proc. USNM 53, p 329, pl.40, fig.7

.... Shell not exceedingly slender Acapulco ...... *falcata* Carpenter

Proc. USNM 53, p. 327, pl.42, fig.6

... Periphery rounded Lower Calif. .... *grippi* Bartsch

Proc. USNM 53, p. 327, pl.42, fig.5

. Shell less than 5 mm. in length

.. Flexure confined to the tip

... All whorls rounded Pt. Abreojos .... *halia* Bartsch

Proc. USNM 53, p. 322, pl.40, fig.2

... All whorls not well rounded

.... Lower whorls slightly rounded Ecuador .... *elenensis* Bartsch

Proc. USNM 66, p.9, pl.2,fig.5

.... Lower whorls flattened Gulf of Calif. .... *townsendi* Bartsch

Proc. USNM 53, p. 323,pl.40, fig.1

.. Flexure not confined to the tip

... Flexure slight

.... Periphery of last whorl inflated Ecuador .... *tia* Bartsch

Proc. USNM 69,p.17,pl.3, fig.1

.... Periphery of last whorl not inflated

..... Base moderately long Ecuador .... *copa* Bartsch

Proc. USNM 69, p. 17, pl. 3, fig.2

..... Base short Lower Calif. .... *lastra* Bartsch

Proc. USNM 53, p 321, pl.40, fig.3

... Flexure distinct

.... Flexure in a single direction

..... All whorls rounded Panama .... *adamantina* de Folin

Proc. USNM 53, p. 331, pl.42, fig.1

..... Lower whorls only slightly rounded

...... Periphery weakly angulated Pt. Abreojos ... *cosmia* Bartsch

Proc. USNM 53, p. 322, pl.40, fig. 6

...... Periphery well rounded Gulf of Calif. .... yod Carpenter
Proc. USNM 53, p. 330, pl.40, fig.9
.... Flexure in two directions
..... Last whorl greatly swollen Panama .... gibba de Folin
Proc. USNM 53, p. 332, pl.43, fig.2
..... Last whorl not greatly swollen
...... Periphery obscurely angulated Panama .... iota C.B. Adams
Proc. USNM 53, p. 332, pl.40, fig.5
...... Periphery rounded
.... Shell exceedingly slender Pt. Abreojos ...... taravali Bartsch
Proc. USNM 53, p. 328, pl.42, fig.2

Balcis micans (Carpenter),1864	Vancouver to Pt. Abreojos
Balcis rutila (Carpenter),1864	Vancouver to Magdalena Bay
Balcis oldroydi (Bartsch),1917	San Pedro to Pt. Sbreojos
Balcis hemphilli (Bartsch),1917	San Diego to Gulf of Calif.
Balcis californica (Bartsch),1917	Catalina to San Martin Island
Balcis compacta (Carpenter),1864	San Pedro to Pt. Abreojos
Balcis baldra (Bartsch),1917	Pt. San Hipolito
Balcis mexicana (Bartsch);1917	Gulf of California
Balcis dalli (Bartsch),1917	Gulf of California
Balcis linearis (Carpenter),1858	Gulf of California
Balcis abreojosensis (Bartsch),1917	Pt. Abreojos
Balcis producta (Carpenter),1863	Mazatlan
Balcis retexta(Carpenter)1858	Mazatlan
Balcis rosa (Willett),1944	off Redondo Beach, Calif.
Balcis bipartita (Morch),1860	West Mexico
Balcis solitaria (C.B. Adams),1852	Panama
Balcis panamensis (Bartsch),1917	Santa Rosa Island to Lower Calif.
Balcis lastra (Bartsch),1917	San Pedro to Magdalena Bay
Balcis grippi (Bartsch),1917	San Pedro to Pt. Abreojos
Balcis berryi (Bartsch),1917	Monterey to Catalina
Balcis bakeri (Bartsch),1917	San Diego
Balcis yod (Carpenter),1857	Mazatlan
Balcis cosmia (Bartsch),1917	Pt. Sbreojos
Balcis halia (Bartsch),1917	Pt. Abreojos
Balcis taravali (Bartsch),1917	Pt. Abreojos
Balcis townsendi (Bartsch),1917	Gulf of Calif.
Balcis falcata (Carpenter),1864	Acapulco, Nicaragua
Balcis iota (C.B. Adams),1852	Panama
Balcis adamantina (de Folin),1867	Panama
Balcis gibba (de Folin),1867	Panama
Balcis capa (Bartsch),1926	Ecuador
Balcis tia (Bartsch),1926	Ecuador
Balcis ononensis (Bartsch),1924	Ecuador

Balcis rosa (Willett),1944. Bulletin So. Calif. Acad. Sci. vol. 43, pp. 71-73, pl.14, fig.2. Off Redondo Beach, Calif. in 125 fathoms.

The original description follows:

" Shell imperforate, slender, straight except for an almost imperceptible inclination of the first four whorls to the right. Whorls 12, increasing in diameter very slowly; the last whorl proportionately very high and usually straight along the sides. Sutures appressed, obscure. Aperture narrow and high, very acutely angled above. Outer lip normal; inner lip reflected over and appressed to the base and continuing to join the outer lip. Color bluish-white, except where the brownish animal shows through.

The unique type, No. 1075 Los Angeles County Museum, was dredged by John Q. and Tom Burch in 125 fathoms, off Redondo, California. It measures Long. 11, lat. 2.5 mm.

In shape this species is similar to some of the more slender specimens of M. rutila Carpenter, but it is very much larger than that shell. It differs from M. micans Carpenter in more slender shape (nearer parallel s sides), and proportionately much higher aperture and last whorl.

The species is named for Mrs. Rose Burch, wife of the senior collector and mother of the junior."

Balcis portlandica (Bartsch),1927. Proc. U.S.N.M., no. 2660, vol.70, art. 11, p.4, pl.1, fig.6. Type locality, Portland, Oregon and known only from type. Dr. Bartsch in the original description makes the statement " The type .... was donated by Mrs. I.S. Oldroyd and was collected at Portland, Oregon." Of course, there is something very wrong here because as pointed out by Mr. A.G. Smith and others Portland, Oregon is on the Willamette River and a long way from the Oregon coast and the Willamette River is certainly running fresh water.

Balcis montereyensis (Bartsch),1917. Ketchikan, Alaska (Willett) to Monterey Bay. Type locality, Monterey, Calif.

Collecting data: Ketchikan, Alaska (low tide) (G. Willett); off Monterey in 20 fms. on shale bottom (Burch); 10 to 15 fms. in Monterey Bay, rare (A.G. Smith);

Balcis peninsularis (Bartsch),1917. San Diego, Calif. to Magdalena Bay, L.C. Type locality, Lower California.

Collecting data: Hipolito Point, L.C. (Hemphill) (San Diego Museum);

Balcis lastra (Bartsch),1917. San Pedro, Calif. to Magdalena Bay, L.C. Type locality, Point Abreojos, Lower Calif.

Balcis thersites (Carpenter),1864. Monterey, Calif. to San Geronimo Island, Lower Calif. Type locality, Santa Barbara, Calif.

Collecting data: Monterey, Calif. in 10 to 20 fms.; Malaga Cove, Los Angeles Co. in 10 to 15 fms.; Avalon, Catalina Island in 25 fms.; Redondo Beach, Calif. in 25 fms.; Dana Point, Orange Co. in 15 fms.; San Onofre, Calif.; Todos Santos Bay in 10-15 fms. (Burch); Monterey Bay, shore to 20 fms., common (A.G. Smith); Mazatlan (Strong); San Geronimo Island, L.C. (Lowe); So. Coronado Island in 20 fms. (Baker); La Jolla, Calif.(Chaney); San Pedro and Monterey (Lowe);

Balcis columbiana (Bartsch),1917. Baranoff Island, Alaska to Departure Bay, B.C. Type locality, Departure Bay, B.C.

Collecting data: Baranoff Island and Ketchikan, Alaska (G. Willett); Frederick Sound, Alaska in 12 fms. (Lewis) (Willett); Hoonak, Chichagoff Island, Alaska, commensal on X Fusitriton oregonense(Redfield) collected by I Norberg (Eyerdam); Petersburg, Alaska,1936 (G. Willett); Departure Bay, Vancouver, B.C. (Lowe) (San Diego Museum).

Balcis comoxensis (Bartsch),1917. Comox, Vancouver Island, B.C.

Balcis macra (Bartsch),1917. Forrester Island, Alaska to Puget Sound. Type locality, Departure Bay, B.C.

Collecting data: Forrester Island and Craig, Alaska (G. Willett); Puget Sound (Oldroyd) (San Diego Museum).

Balcis berryi (Bartsch),1917. Monterey Bay to Coronado Island, Calif. Type locality, off Del Monte, Monterey, Calif.

Collecting data: Dredged in 10 and 20 fms. off Del Monte, Monterey, Calif. and also in 10 fathoms off Pacific Grove (Burch); Cayucos,Calif. in 5 fms. (G. Willett); Monterey Bay in 10-25 fms., scarce (A.G. Smith); San Pedro, Calif. (Lowe); Del Monte in 10 fms. (Lowe); South Coronado Island, Lower Calif. (Baker- identified by Strong) (San Diego Museum).

Balcis grippi (Bartsch),1917. San Pedro, Calif. to Point Abreojos, L.C. Type locality, Newport, Calif.

Collecting data: Catalina Island in 30 fms. (G. Willett); So. Coronado Island, Mexico in 12-15 fms. (Baker); Catalina Island in 35 fms. (Lowe); La Jolla (Lowe)

Carmel, Calif. south to
Balcis catalinensis (Bartsch),1917. Santa Rosa Island, Calif. to San Hipolito Point, L.C. Type locality, Catalina Channel, dredged.

Collecting data: Off Redondo Beach, Calif. in 25 fms. gravel bottom, and in 50 fms. on N. side of submarine canyon in foraminifera bottom, and in 75 fms. and 100 fms. mud bottom; off Avalon, Catalina Island, Calif. in 35 fms. (Burch); So. Coronado Island in 15 fms. (Willett); So. Coronado Island, Mex. in 3 fms. (Baker); Catalina Island in 35 fms. (Lowe); 25 fms. off Carmel, Calif. (A.G. Smith) (extension of range northward).

Balcis micans (Carpenter),1864. Prince William Sound, Alaska (Eyerdam) south to Point Abreojos, L.C. Type locality, San Pedro, Calif.

Collecting data: Monterey, Calif. in 20 fms. shale; common off Redondo Beach in 25 fms. gravel; Venice, Calif.; Malaga Cove; Todos Santos Bay in 20 fms. (Burch); common in Pleistocene of Baldwin Hills (Burch); Strait of Fuca (Eyerdam); Lower Calif. (Oldroyd); San Diego (Hemphill and Baker); Laguna Beach (Chaney); San Pedro (Chaney, Lowe and Baker) (San Diego Museum); Monterey Bay, 5-25 fms., fairly common. Sometimes found living comensally on the under parts of starfish. (A.G. Smith).

Balcis micans borealis (Bartsch),1917. Kodiak Island, Alaska to Vancouver Island, B.C. Type locality, Comox,Vancouver Island, B.C.

Collecting data: Dredged off San Juan Islands, Puget Sound (T. Kincaid); Departure Bay, Vancouver Island (Lowe); Forrester Island, Craig, and Ketchikan, Alaska. " I think this is a synonym" (G. Willett).

Balcis rutila (Carpenter),1864. Forrester Island, Alaska to Magdalena Bay, L.C. Type locality, Monterey, Calif.

Collecting data: In our experience this is by far the most common species of the genus. Is is commensal on starfish and other echinoderms. We found them in great numbers on starfish picked up in the dredges off Monterey and Pacific Grove and also on down the coast. One rather interesting habitat was the mud flats off El Segundo and Hermosa Beach perhaps 3 or 4 miles off shore in about 25 fathoms, on the large sea cucumber, a holothurian of the genus Stichopus , is so exceedingly abundant that it is a menace to dredging and trawling because the equipment is promptly brim full of the holothurian and little else. However, the species os Balcis isas thick on those things as fleas on a dog and one dredge haul of those holothurians and you could pick off enough rutila to last a lifetime. Of course, we occasionally picked off other species of Balcis on both the holothurians and the starfish.

The bathymetric range of this species is of some interest also. We have them from almost on shore all the way down to below 100 fathoms and from every type of bottom, soft mud,soft sand,coarse sand, gravel,rocks, etc. We have often tried to detect some difference in these odd lots, but they seem to our eyes to be perfectly identical. It is a common fossil in the Pleistocene of Hilltop Quarry, Baldwin Hills, etc. (Burch). Craig, Alaska and South Coronado Island, Mexico in 15 fms. (G. Willett); Monterey Bay, 15-25 fathoms, fairly common. Also commensal on starfish (A.G. Smith).

Balcis oldroydi (Bartsch),1917. Monterey, Calif. to Point Abreojos, L.C. Type locality, San Pedro, Calif.

Collecting data: Off Redondo Beach, Calif. in 25 fms.; off Ensenada, Mexico in 15 fms.; fossil in the Pleistocene of Hilltop Quarry, Del Rey deposit of Baldwin Hills etc. (Burch); Monterey Bay in 10-25 fms., rare (A.G. Smith); Ocean Beach (Field); San Pedro in 10 fms. (Lowe); Vancouver Island, B.C. (Oldroyd) (San Diego Museum).

Balcis randolphi (Vanatta),1899. Aleutian Islands to Puget Sound. Type locality, Unalaska, Alaska under stones.

Collecting data: Dutch Harbor,Alaska (Lowe Collection); " I have most of the type specimens collected by Randolph in 1898 at Dutch Harbor. I also collected them in the same spot in 1932 commensal on broad sponges under rocks at low tide. " (W.J. Eyerdam)

Balcis californica (Bartsch),1917. Catalina Islandand San Martin Island, Type locality, Catalina Island, Calif.

Collecting data: San Martin Island (Baker); Catalina Island (in 35 fms. (Lowe);

Balcis hemphilli (Bartsch),1917. San Diego, Calif. to Mazatlan,Mexico. Type locality, Point Abreojos, L.C.

Collecting data: Pt. Abreojos (Hemphill); Mazatlana nd La Paz (Lowe) (San Diego Museum)

Balcis compacta (Carpenter),1864. San Pedro to Point Abreojos, L.C. Type locality, San Pedro to San Diego.

Collecting data: Pt. Abreojos (Hemphill); San Martin Island (Baker) (San Diego Museum)

Balcis tacomaensis (Bartsch),1917. Forrester Island , Alaska to Tacoma, Wash. to Crescent City, Calif. (Chace). Type locality, Tacoma.

Collecting data: Point St. George, north of Crescent City (Chace); Crescent City, Calif. (Lowe);

Genus Sabinella Monterosato, 1890. Natur. Sicil. 1890, p.15

Type , Sabinella piriformis Brugnone.

" Shell conic, polished, without color markings, whorls rounded, aperture large, inner lip not appressed to the attenuated base, outer lip decidedly expanded " (A.M. Strong).

Sabinella bakeri Bartsch,1917. San Diego.

Sabinella ptilocrinicola (Bartsch),1907. U.S.S. Albatross Sta. 3342, in 1,588 fms. off British Columbia, commensal on crinoids.

Mr. Strong lists the following species from the southern fauna:

Sabinella opalina de Folin,1867.	Panama
Sabinella chathamensis Bartsch,1917	Galapagos
Sabinella meridionalis Bartsch,1917	Galapagos

Genus Entocolax W. Voight,1888. Type E. ludwigi Voight

Mrs. Oldroyd stated that she had been unable to get the description of either this genus or species. Dr. A. Myra Keen has supplied us with this information (Per. Comm. Aug. 1945) " On a separate sheet are some notes on Entocolax . I did not try to copy the original description.However, at the end there is a brief summary of the new species which I have copied. The entire article (pp. 658-685) is one long verbose description."

Thiele " Handbuch der Syst. Weich.",1929 supplies figures of the animal and a description of the genus in German, of course, which follows:

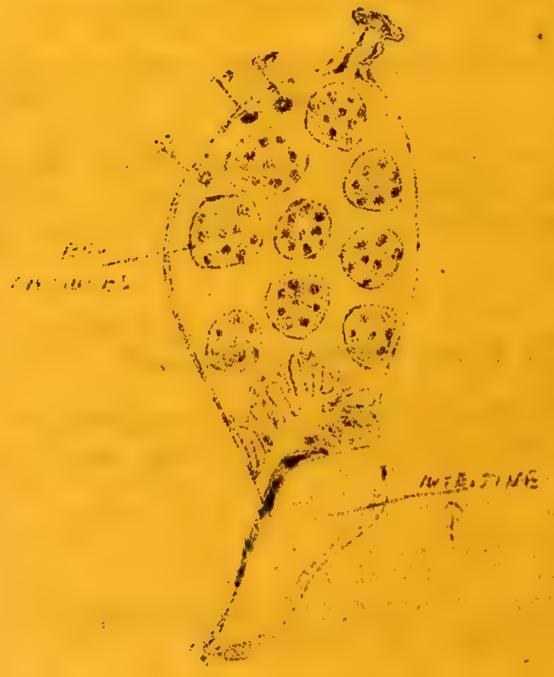
" Die Korperform erinnert an die von Gasterosiphon, das Tier ist durch ein kurzes Rohr (Sipho) an der Darmwand des Wirtes befestigt, am entgegengesetzten Ende findet sich der in einen Blinddarm fuhrende Russel, uber ihm liegt ein gelap ted Ovarium, dessen Ausfuhrungsgang in einen weiten Hohlraum mundet, in dem Eierballen abgelegt sind, die ungebendeWandung durfte einen Scheinmantel darstellen; durch den Sipho gelangen die Eier in den Darm des Wirtes. Die Geschlechter sind getrennt, die Mannchen sind sehr klein, rundlich, deren Organe bis auf den eiformigen,mit einem kurzen Ausfuhrungsgange versehenen Hoden rudimentar sind, sie halten sich in der Bruthohle des Weibchens auf."

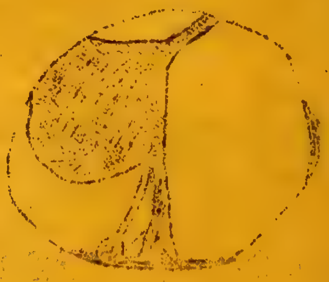
Thiele places this genus in a separate family Entoconchidae

Entocolax ludwigi Voight,1888. Bering Sea, parasite of Myriotrochus.

Original description (p. 685) " Mannchen unbekannt. Der Korper des erwachsenen Weibchens bildet einen 1 cm. langen,vorn gleich weiten, am Hinterende verjungten Schlauch, der eine kurze, strecke hinter seinem Vorderende zu einer grossen 3 mm. dicken Kugel aufgetrieben ist, welche die Eier enthalt. In Myriotrochus rinkii, Behringsmeer. Sitzt innen an der Liebeswand der Holothurie."

Type locality: Bering Sea, in intestine of the Holothurian Myriotrochus.





Traced from Thiele. Voight had overlooked the males among the egg capsules.

Genus Entoconcha J. Muller,1852. Type E. mirabilis J. Muller

Shell obovate, smooth; spire short, very obtuse apex not elevated, whorls rapidly increasing; aperture transverse, semilunar, angulated above, rounded below,width almost equalling the height, margins disunited, the columellar margin straight. Operculum non-spiral." Found on Synapta digitata one of the Holothuridae, at Trieste. This is probably the larval stage of some mollusk. " (Tryon, S & S. Conch.,1883, p.331).

Professor Trevor Kincaid of the University of Washington sent us a vial of these animals preserved in alcohol taken from the circumoral region of the large holothurian Stichopus californicus. In our Minutes #17, p.4, Nov. 1942 we ran an account of the finding of these parasites written by Professor Kincaid. Some work had been done on the species by the late Professor J.E. Guberlet.

Later in our Minutes #21, p.3, March,1943 we ran another article on this genus by P.J. Van Beneden.

A review of our first report of this new genus and species to our fauna follows: Sept. 21,1942- I spent the summer at Friday Harbor in the San Juan Islands where the University of Washington maintains its oceanographical laboratories. During the summer we utilized to some extent the large red sea cucumber, Stichopus californicus as an element in our commissary. The muscular tissue of the animal can be made into an excellent soup or chowder. In opening up large numbers of the cucumbers we occasionally encountered the strange parasitic gastropod, Entoconcha. It appears as a long worm-like organism attached at one end to the circumoral region of the echinoderm. No one would dream of its affinities since all gastropod features are absent, but the body cavity contains embryos in various stages of development, and the more advanced ambryos were found to be typical veliger larvae looking very much like those of the sea slugs."

" Your letter of Sept. 25 is at hand. I will send you a specimen of Entoconcha for your collection. It will look odd in a cabinet and the ordinary conchologist would probably tear his hair trying to figure out what to do with it, since it has no sign of a shell in the adult stage. The larval form, however, of which I will send you a prepared slide is a dead ' give away' since the little chap is a typical veliger and is provided with a beautiful curved larval shell and even has an operculum. "

Animal Parasites and Messmates- by P.J. Van Beneden (published in 1876) (copied from paragraphs on pages 158-159) " We do not know if this is the place to speak of an animal which excited great attention some years ago,and which was thought to prove the transformation of animals into each other. It is a parasite which, under the form of a gasteropod, lives under peculiar conditions. It is known by the name of Entoconcha. Discovered by J. Muller in an echinoderm of the genus Synapta , its complete development has been vainly sought to be discovered since that time. It is evidently a gasteropod mollusc, allied to the Natices, and lives in the interior of the body of a Synapta, but we do not yet know all the phases of its evolution. It was at first thought that we had before us an echinoderm in the act of trahsformation. I wrote J. Muller immediately after the discovery which he hastened to announce to me, to state that in my opinion, this was only a new instance of parasiticism; parasited are, however, so rare in this class of animals, and their mode of life is so exceptional, that one ought not to be surprised that this fact did not receive at first its true interpretation."

" Professor Semper found at the Philippine Islands, in the Holothuria edulis another species of Entoconcha which appears to attach itself to the anal vent of this echinoderm. He gave it the name of Entoconcha mulleri. We have in it a new example of the relations which certain parasites bear to their hosts, and which are the same in both hemispheres."

(con.)

Entoconcha mirabilis J. Muller,1852. Puget Sound in the circumoral region of Stichopus californicus.

It is possible that this will prove to be a new species. However, the animal fits the description and the figure in Thiele,1929, p.231. The figure is traced below.

Professor Kincaid writes " In regard to Entoconcha I will loop up the literature more thoroughly than I have done up to this time and see what can be done about this obscure organism."

Traced from Thiele

Genus Cythnia Carpenter,1864. Dr. A. Myra Keen advises (Per.Comm.) Type (monotypy) C. asteriaphila Carpenter. This has been variously misspelled, and under the misaprehension that it was homonymous, Dall suggested renaming it Cythnoa. There is no prior Cythnia,however, so far as I can determine."

" Imbedded in starfish like Stylifer, from which it is distinguished by its normal nuclear whorls, and thin concentric operculum." (Tryon S. & S. Conch.)

Cythnia albida Carpenter,1864. Southern California. Parasitic on Starfishes. (Dall).

Dr. A.M. Keen advises " The type locality of albida is San Diego, according to the holotype label in the U.S. National Museum, no. 15569.

None of our members report having taken the species.

Genus Haliella Monterosato,1878. Type (fide Winckworth,1932), Eulima stenostoma Jeffreys.

" Shell elongate conic, straight, smooth, polished, aperture ovate, the inner lip with twist giving the appearance of an obsolete fold."

Haliella abyssicola Bartsch,1917. In 822 fathoms off San Diego, California and southward to latitude 27 north, off Point Pablo, Lower Calif. in 284 fathoms. (Dall). The date was published in Bull. 112 in error as 1908.

Haliella lomana Dall,1908. Off Point Loma, San Diego County, Calif. In 650 fathoms.

Genus *Eulima* Risso, 1826. Type (by subsequent designation Hermannsen, 1846) *Turbo subulatus* Donovan = E. glabra (da Costa)
In synonymy, *Strombiformis* auct. The above fide Winckworth, Journ. of Conch., vol. 20, no. 1, pp. 12, 13 1934.

" Very attenuated, slender Melanellids, with very narrow elongated aperture, having the inner lip appressed to the attenuated basal portion of the preceding whorls; marked with one or more spiral color bands." (Bartsch).

The following key to species and list covering the coast is adapted from Mr. A.M. Strong's note book. Mr. Strong uses *Strombiformis*. Following the list we will take up a discussion of our species north of San Diego.

Shell with color markings, inner lip appressed to the base .. *Eulima*
. Shell with varical lines or axial colored streaks
.. Shell over 10 mm in length
... Lower whorls slightly rounded
.... Surface chalky white (fossil)
10 whorls, 12 x 2.5 mm. Santa Monica Pleistocene ... *riversi*
... Lower whorls flattened
.... Light brown with two chestnut brown spiral bands
13 whorls, 11.5 x 2.1 mm. Catalina to San Diego .. *californica*
.... Flesh colored, with 3 pale brown spiral bands
13 whorls, 11 x 2.5 mm. Gulf of Calif. .... *townsendi*
.. Shell less than 10 mm. in length
... Lower whorls slightly rounded
.... Shell broadly elongate conic
..... Bluish white, with a band of light chestnut brown
10 whorls, 7 x 1.8 mm. San Pedro to San Diego ...... *almo*
.... Shell elongate conic
..... White Central America .... *acuta*
... Lower whorls flattened
.... Shell broadly elongate conic
..... With irregular, triangular streaks of brown
9 whorls, 3.1 x 1.1 mm. Pt. Abreojod .... *hemphilli*
.... Shell slenderly elongate conic
..... Flesh colored with a broad light and 2 dark brown bands
13 whorls, 7.8 x 1.3 mm. Gulf of California ..... *lapazana*
..... Upper whorls white, lower pale brown with a darker suture
11 whorls, 6 x 1.3 mm. Panama .... *panamensis*
. Shell without varical lines or colored axial streaks
.. Lower whorls well rounded
... Spotted along the suture with triangular reddish dots
11 whorls, 3.3 x 1.5 mm. Panama .... *proca*
... Two spiral bands of yellow and white spots
10 whorls, 5 x 1.5 mm. Panama .... *elegantissima*
.. Lower whorls flattened or very slightly rounded
... Shell broadly elongate conic
.... Shell yellowish white
7 whorls, 4.2 x 1.4 mm. Unalaska .... *alaskensis*
.... Light yellow, tip and middle of base brown
9 whorls, 2.7 x 0.9 mm. Gulf of California ... *barragei*
... Shell elongate conic
.... Anterior third of whorls dark brown
10 whorls 4.7 x 1.3 mm. Cape San Lucas ...... *fuscostrigata*

.... Uniformly pale brown
11 whorls 5 x 1.3 mm. Santa Maria Bay .... barthelowi
.... Colors various, white or brown, streaked or mottled
Central America .... varians

Eulima californica (Bartsch),1917	Catalina to San Diego
Eulima almo (Bartsch),1917	Santa Rosa Island to San Diego
Eulima fuscostrigata (Carpenter),1864.	Cape San Lucas
Eulima barthoelowi (Bartsch),1917	Santa Maria Bay
Eulima hemphilli (Bartsch),1917	Pt. Abreojos
Eulima burragei (Bartsch),1917	Gulf of California
Eulima townsendi (Bartsch),1917	Gulf of Calif. to Nicaragua
Eulima lapazana (Bartsch),1917	La Paz
Eulima jacula (Pilsbry & Lowe),1932	Mazatlan
Eulima varians (Sowerby),1834	Central America-
Eulima acuta (Sowerby),1834	Central America
Eulima panamensis (Bartsch),1917	Panama
Eulima proca (de Folin),1867	Panama
Eulima elegantissima (de Folin),1867	Panama
Eulima salsa (Bartsch),1926	Ecuador
Eulima paria (Bartsch),1926	Ecuador
Eulima hua (Bartsch),1926	Ecuador
Eulima inca (Bartsch),1926	

Eulima californica (Bartsch),1917. Santa Cruz Island and Redondo Beach (Burch) to Todos Santos Bay (Burch).
Type locality, dredged in San Diego Bay.

Grant and Gale,1931 placed this species in the synonymy of raymondi Rivers,1904, Bull. So. Calif. Acad. of Sci. vol.3, no.5, p.70,May,1904. They also included riversi Bartsch,1917. Grant and Gale were of the opinion that the Recent species californica is identical with Rivers fossil species and some of us accepted their conclusion. However, Mr. A.M. Strong advises us on this matter and we are following Strong on this. Mr. Strong stated (Per. Comm. Aug.1945) " I have a topotype of this species and do not think it is the same as californica Bartsch. The first with 10 whorls minus the nuclear whorls (discussing riversi Bartsch) probably a matter of less than a mm. is 12 mm. in length, and the ratio of diameter to length is 1 to 4.1. In the second the figure also shows the tip broken and it is stated to have 13 whorls measuring 11.5 mm. with a ratio of diameter to length of 1 to 5.5. I do not have the measurements of raymondi Rivers, but the locality seems to be the same, Pleistocene of Santa Monica. Dr. Clark relocated this place and I think is the only one to have collected there. Perhaps the name has been wrongly used for shells from other localities which are more like californica. The colors are used largely in distinguishing a species in the genus and of course we know little about the colors in the fossil."

Collecting data: Santa Cruz Island in 50 fms.; Redondo Beach in 50 and 75 fms.; Ensenada,To os Santos Bay in 50 fms. (Burch); Catalina Island in 30 fms.; Long Beach in 20 fms.; Newport Bay in 20 fms. (Lowe)(San Diego Museum).

Eulima alaskensis (Bartsch),1917. Dutch Harbor,Unalaska,Aleutians

Eulima almo (Bartsch),1917. Santa Rosa Island to San Diego. Type Loc. " in 53 fms. off Sta. Rosa Id. on fine gray sand and mud bottom"
Collecting data: San Diego in 60 fms. (Kelsey) (San Diego Museum).

Genus Aclis Loven,1846; Type (by monotypy), Alvania supranitida Wood(Pliocene, England).

" Shell minute, like Turritella; usually spirally striated; apex sinistral; aperture oval; outer lip prominent; axis slightly rimate. Operculate."(Loven).

There seems to be any number of questions to be answered by the student of this group. Carpenter in the Mazatlan Catalogue says " In this genus are deposited smooth or slightly sculptured shells; with more or less numerous whorls, tumid or loosely spiral, the apex sinistral, and the mouth rounded or oval, without plait."

Mr. A.M. Strong comments on the above as follows " A sinistral apex is not mentioned in the description of any west coast species. Oldroyd places the genus in Melanellidae, Carpenter lists it just ahead of Eulima, but Bartsch does not include it in his paper. I have no idea where it belongs and it is doubtful if any west coast species really belongs in the genus. We have never recognized any of the species listed in the genus and as far as is known none of them have been figured."

Subgenus Aclis s.s. The following species have been described under this name.

Aclis turrita (Carpenter),1864. San Pedro, Calif. to San Diego,Calif. Type locality, San Pedro, Calif.

Dr. A.M. Keen in " Abridged Check List" refers to Alabina following both this species and the following, and comments on them as follows (Per. Comm. Aug.45) " Aclis turrita was taken at San Diego by Kelsey. Bartsch classified both turrita and occidentalis as Alabina in 1911 (Proc. USNM, v. 39, p.410). What they really are I don't know; apparently Dr. Bartsch was'nt sure."

Aclis occidentalis (Hemphill),1894. San Diego, Calif.

Subgenus Graphis Jeffreys,1867. Type (by monotypy), Turbo unicus Montagu.

Aclis shepardiana (Dall),1919. San Pedro to San Diego, Calif. Type locality, San Pedro, Calif.

Collecting data: Our only collecting report on this species comes from Mr. Allyn G. Smith " I collected a single specimen in the drift at White's Point."

Aclis californica Bartsch,1927. San Clemente Island. Proc. USNM, no. 2660, vol.70. Type locality " on rocks at San Clemente Island".

Collecting data: We have specimens so labelled fossil from the Pleistocene of the Lomita gravel pits, but no Recent specimens. (Burch).

The following species have been described from the southern fauna.

Aclis fusiformis (Carpenter),1857.	Mazatlan
Aclis tumens (Carpenter),1857.	Mazatlan.

Genus Niso Risso,1826. Type (by monotypy), N. eburnea Risso.

" Shell broadly conic or elongate conic; deeply umbilicated; smooth or indistinctly varicous; unicolor or with longitudinal stripes or markings." (Strong).

Niso lomana Bartsch,1917. Santa Rosa Island to Point Loma,Calif. Type locality, in 48 fathoms off Santa Rosa Island.

Niso hipolitensis Bartsch,1917. San Diego, Calif. to San Hipolito Point, L.C. Type locality, San Hipolito Point, L.C.

Mr. A.M. Strong in his notebook lists the following additional species from the southern fauna.

Niso excolpa Bartsch,1917.	Gulf of California
Niso splendidula (Sowerby),1834	Panama to Ecuador
Niso interrupta (Sowerby),1834	Panama
Niso imbricata (Sowerby) 1834	Ecuador

Mr. A.M. Strong lists the following genera and species from the southern fauna.

Genus Lambertia Souverbie,1869. Type, L. montrouzieri Souverbie.

Lambertia cookeana Bartsch,1917.	Lower California

Genus Scalenostoma Deshayes,1863 Type, S. carinatum Deshayes

Mr. Strong makes an interesting comment on this genus as follows " In Bull. 68, U.S. Nat. Mus., Dall and Bartsch make this a subgenus of Odostomia and place in it two species, dotella from the Gulf of California, and rangia de Folin from Panama. In Proc. U.S. Nat. Mus. Bartsch describes an Odostomia (Scalenostoma) babylonia from San Hipolito Point. Again Bartsch in Proc. U.S. Nat. Mus. vol.53, p.337 makes Scalenostoma a full genus in Melanellidae and redescribes rangia and babylonia. No mention is made of dotilla and I cannot find where it goes. This does not come in our study but shows how closely things have to be checked."

Scalenostoma babylonia (Bartsch),1912.	Point San Hipolito
Scalenostoma rangia (de Folin),1867.	Panama

Genus Eulimostraca Bartsch,1917. Type, E. galapagensis Bartsch

Eulimostraca galapagensis Bartsch,1917.	Galapagos
Eulimostraca bartschi Strong and Hertlein,1937.	off Corrientes, W. Mexico

Genus Stilifer Broderip,1832. Type, Stilifer astericola Broderip

Stilifer astericola Broderip,1832.	Galapagos

* Note* We are bipassing the Pyramidellidae for a brief time. Mr. A.M. Strong is checking up some large lots pf material and preparing additional data on this family. It will be taken up very shortly. In the meantime we will proceed with the other groups.

Suborder Nucleobranchiata

Family Pterotracheidae

Genus Cardiapoda Orbigny,1836. Type, C. placenta Lesson.

" Shell minute,cartilaginous; peristome expanded and bilobed in front, enveloping the spire behind." (Tryon S. & S. Conch.).

There was some discussion of the family position of this genus. Dall in Bull. 112 placed it as above, but Thiele places the genus under the family Carinariidae even though using the family Pterotracheidae. Dr. H.R. Hill was of the opinion that we should follow Dall. Dr. Joshua L. Baily Jr. commented as follows " The Pterotracheidae, if I understand them correctly, never having seen one, are so different from the other nucleobranchs as to raise the question as to whether it really belongs here. I believe it has no shell. If Cardiapoda has a shell I would place it in the Carinariidae. Dr. A. Myra Keen stated " Thiele probably has evidence to justify placing

Cardiapoda in Carinariidae."

One thing seems obvious and that is that all of these pelagic forms are badly in need of work. It is to be hoped that some of us will be able to drag some tow-nets on future ocean trips and get material to settle some of these problems.

Cardiapoda placenta (Lesson),1830. Dall and Oldroyd give the range of this species as North Pacific, Pelagic. However, Dr. A.M. Keen advises " The type locality of C. placenta is " dans les mers qui baignent des cotes de la Louvelle-Guinea"-- in other words, New Guinea, not North Pacific."

Family Carinariidae

Genus Carinaria Lamarck,1801. Type, C. cristata (Linnaeus).

" Animal having the visceral sac conical and small in proportion to the rest of the body, which cannot be withdrawn into the shell; foot elongated, fin-shaped, with a sucker, but without an operculum. Shell small in proportion to the size of the body, symmetrical, cup-shaped, thin and transparent" " Shell thin, hyaline, glassy, symmetrical, conical, compressed, with a recurved apex, a minute dextrally-spiral nucleus, and a fimbriated dorsal keel; aperture large, ovate, entire." (Suter,1913).

Carinaria punctata Orbigny,1836. North and South Pacific. Pelagic.

Dr. A.M. Keen advises " The type locality of Carinaria punctata was not given, but from the title of the work (" Voyage dans l'Amerique meridionale") one may construe it as being in the Panamic marine province.

Carinaria latidens Dall,1919. North Pacific in north latitude 43 10' and west longitude 147. Pelagic.

Family Atlantidae

Genus Atlanta Lesueur,1817. Type (by subsequent designation, Gray, 1847) A. peronii Lesueur,1817.

" Shell discoidal, fragile, transparent, compressed, carinated throughout, and capable of containing the whole animal; protoconch dextral, forming a small nucleus; aperture oval, narrow, fissured; peristome simple, sharp. Operculum subtrigonal, with a small apical nucleus, which is dextrally spiral." (Suter).

Atlanta peronii Lesueur,1817. Dr. A. Myra Keen advises " The type locality of A. peronii is definitely not " North Pacific" as Mrs. Oldroyd has it. It is, rather, lat. 19 degrees 45', long. 32 degrees 42'-- whether north or south he does not say. I assume it would be north latitude, in which case the locality would be somewhat west of Cape Verde Islands, Atlantic Ocean."

Atlanta involuta Gray,1850. Pacific Ocean. Pelagic.

The following discussion applies to this species as well as to the following six species. Dr. A. Myra Keen writes (Per. Comm. Aug.45) "As Dall explains, Gray latinized the vernacular names in the " Voyage..Bonite"; but Dall does not cite the name of the author of the latter work-Eydoux. As the only copy of the " Voyage..Bonite" of which I know is at the University of California, perhaps you can get Mr. Allyn Smith to verify my hunch that the descriptions which Mrs. Oldroyd attributes to Gray are actually from vol.2 (1852) of the text by Eydoux. Certainly they are not Gray's work, as his consists of name and figure only, the figures being traced by Mrs. Gray from Eydoux's " Atlas". I doubt very much whether the type localities of any of these are North Pacific, but one would have to consult the text of Eydoux to determine that point."

Atlanta inclinata Gray,1850. Pacific Ocean. Pelagic.
Atlanta helicinoidea Gray,1850. Pacific Ocean. Pelagic.
Atlanta brunnea Gray,1850. Pacific Ocean. Pelagic.
Atlanta gaudichaudii Gray,1850. Pacific Ocean. Pelagic.
Atlanta depressa Gray,1850. Pacific Ocean. Pelagic.
Atlanta quoyii Gray,1850. Pacific Ocean in north lat.33, west long. 135 10'. Pelagic.

Atlanta cunicula Gould,1852. Dr. A.M. Keen advises " The type locality of A. cunicula is lat. 28 degrees N., long. 178 degrees E. which is N.W. of Midway Island."

Genus Oxygyrus Benson,1835. Type, O. inflatus Benson(by monotypy). " Shell milky, narrowly umbilicated on both sides; nucleus not visible; back rounded, keeled only near the aperture; body whorl, near the aperture and keel cartilaginous; no apertural slit; operculum trigonal,lamellar."

Oxygyrus rangii Gray,1850. ? Pacific Ocean. Off Monterey, Calif. Pelagic. Dr. A. Myra Keen discusses this species (Per. Comm. Aug.1945) " Oxygyrus rangi " Loven" is an impossibility. I suspect that it should be: O. rangii Gray,1850, Figs. molluscous Anim., vol.4, p.101, pl.240, fig.1, traced from Atlas, " Voyage .. Bonite" (1841), pl.18, fig.25. The description that Mrs. Oldroyd quotes is probably by Eydoux, from the text of this work. Certainly it is not of Gray. The Loven reference, (which, by the way, is 1848, not 1847, and page 191, not 491) is to Atlanta rangii and is simply a figure of the radula with no description or indication of authorship.As there is a prior Atlanta rangii D'Orbigny (Voyage dans l'Amerique Meridionale,1836), Loven's illustration must either be considered to be of D'Orbigny's figure or his name is a homonym. Possibly he intended to illustrate the same form that Eydoux later described; but Eydoux' species is homonymous. Gray's usage however, was of Oxygyrus, which would seem to save the species. ... It would be interesting to find out what D'Orbigny's species really is."

Suborder Pectinibranchiata

Family Amphiperatidae (Ovulidae)

There has been a great deal of discussion of the family name, but the unanimous opinion at this time is stated by Dr. A. Myra Keen (Per. Comm.) as follows: " It must be Amphiperatidae, as Amphiperas Meuschen,1781 has priority over Ovula Bruguiere,1789 and their respective type species are congeneric. " However, the spelling of the family name is not unanimous. Some of the problems confronting the student of the spelling are stated as follows by Dr. Joshua L. Baily Jr. (Per. Comm. Aug.45) " The case of Ovula and Amphiperas is not exactly parallel. These two names are identical synonyms, and since Amphiperas is the older, the family name must be made up from it. Ovula is Latin, and the name Ovulidae is correctly formed, but Amphiperas is Greek and I immagine others must have had the same experience with the classics I have had to judge from the variants I have seen in use. The family name has been spelled Amphiperasidae, Amphiperastidae, and Amphiperatidae has been used. At least two are wrong, but which I don't know."

The most important reference on this group is F.A. Schilder, Proc. Mal. Soc. London, 20,1932. We are following Schilders classification with few exceptions. Dr. Dall used the genus Simnia Risso,1826 with three species under Simnia s.s. - vidleri,acicularis, and variabilis; three species under the subgenus Neosimnia- barbarensis, catalinensis, and uniplicata. Thiele considered Neosimnia a section of Simnia. However, we are here following Schilder and placing the species under Neosimnia.

Genus Neosimnia Fischer, 1884. Type (by monotypy), Bulla spelta Linne!

	laebbeckeana	inflexa	vidleri	avena	rufa	aequale
Length	13-23mm	16-17 mm	20 mm	7-11 mm	5-7 mm	12-14mm
Ratio of breadth	34-37 %	31-32%	33%	44-48%	33-36%	33-36%
Shape	fusiform	elongate fusiform	fusiform	ovate fusiform	fusiform	cylindrical fusiform
Dorsal striae	on top of extremities	only on extremities	only on extremities	55-65	rarely on back	only on extremities
Outer lip	involute	involute	convex	flattened	convex	flattened
Anterior 1/3 outer lip	straight	declivous	declivous	declivous	slightly curved	declivous
Denticulation	wanting	wanting	wanting	sometimes present	wanting	wanting
1st funiculum	indistinct	indistinct	indistinct	indistinct	indistinct	indistinct
1st posterior outlet	shallow	shallow	shallow	wanting	obsolete	shallow
2nd funiculum	well marked	indistinct	indistinct	obsolete	indistinct	indistinct
2nd posterior outlet	well marked	shallow	well marked	well marked	well marked	shallow
Fossula	wanting	very shallow	concave	very short	very short	short smooth
usual color	rose pink	fulvous	pink	pinkish white	pinkish white	purple

The above chart is arranged from Schilder, Proc. Mal. Soc. vol.20, 1932, pp. 46-65, pl.3,4,5. From Mr. A.M. Strong's notebook.

The following key taken from Mr. A.M. Strong's notebook may be of interest.

Back smooth or finely striated
. Shell elongate, narrow, ends bluntly produced
.. A longitudinal columellar keel, biplicate posteriorly
Length 14 mm. Monterey to Panama ....variabilis-inflexa
Reeve, pl.11, fig.56; Tryon, 9 -254, pl.5, fig.44
.. Columellar keel conspicuous, undivided
Length 21 mm. Monterey to San Diego .... vidleri
Oldroyd 2-3-235

(con.)

. Shell oblong, extremities shorter
.. Columella with a raised callus margin
Length 30 mm. San Pedro to Panama .... avena
Reeve, p.11, fig. 49; Tryon, 7-255,pl.5,figs. 51-55
.. Columella smooth and rounded
Monterey to Gulf of California .... barbarensis
Oldroyd, 2-2-236
. Shell fusiform, swollen above the middle
.. Columella with a spiral fold and channel at the summit
Length 23 mm. Monterey to Gulf of Calif. .... catalinensis
Oldroyd, 2-2-235
Back with a strong spiral rib
Length 25 mm. Panama to Ecuador .... emarginata
Reeve, pl.7, fig.34; Tryon vol.7, p.251, pl.3,figs. 83-84.

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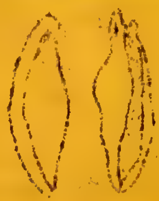
The following list of species will precede a detailed discussion.

Neosimnia loebekeana (Weinkauff),1881.	Monterey to Gulf of Calif.
var. barbarensis Dall,1892.	
var. catalinensis Berry,1916.	
Neosimnia inflexa (Sowerby),1832. (variabilis)	Monterey to Panama
Neosimnia vidleri (Sowerby),1881.	Monterey to San Diego
Neosimnia avena (Sowerby),1832	Monterey to Acapulco
Neosimnia rufa (Sowerby),1832	California to Ecuador
Neosimnia aequale (Sowerby),1832	California to Ecuador
Neosimnia quaylei (Lowe),1935.	Gulf of California

Neosimnia loebbeckeana (Weinkauff),1881. Systematisches Conchylien-Cabinet von Martini und Chemnitz, ed.2, Bd. 5, Abt. 3. (Cypraea and Ovula) p.197,pl.50, figs. 6-7. " Testa elongata,extremitatibus productis, acutis, laevigata,nitida,aurantio-rubescens,extremitatibus modioque pallidior; apertura lata, intus carnea,canalibus brevibus,angustis; columella convexiuscula,utrinque acutissima, superne contorte subplicata,inferne leviter complanate,intus alba; labrum arcuatum,incrassatum,extus marginatum;sinus nulli. Long. 24, diam. maj.7 mm." Type locality," Vancouver -Insel--Ober--californien--(Sowerby) Museum Loebbeckeanum."

We are indebted to Dr. A.M. Keen for the above description as well as the figures and additional data on the following species.



Collecting data: Specimens dredged off Monterey, Calif. in 20 fathoms shale bottom seem to fit the above description perfectly including one to the exact dimentions. (Burch).

Neosimnia loebbeckeana barbarensis (Dall),1892. Monterey to Gulf of California. Type locality, San Pedro, Calif.

Figured by Dall U.S. N.M. vol.15, pl.21, fig.1; Oldroyd, 2-3,pl.98, fig.4.

Collecting data: Not uncommon assosiated with gorgonian off Redondo Beach, Calif. in 35 to 50 fms., also off Rocky Point in 40 fms. (Burch); Monterey (Lowe); San Pedro and Newport (Lowe); Magdalena Bay, L.C. (Lowe) (San Diego Museum)

Neosimnia loebbeckeana catalinensis (Berry),1916. Monterey to Gulf of California (Dall). Type locality, off Avalon, Catalina Island, Calif.

in 50 fms. Figured in Nautilus 30:21; pl.5,fig.3.

There has been some difference of opinion about this species. Mr. George Willett listed it in his paper " An Upper Pleistocene Fauna from the Baldwin Hills, Los Angeles County, Calif.", Trans. San Diego Soc. Nat. Hist. vol.7, p.398,1937 in which he made the following remarks " 2 specimens in Museum collection and 2 more in White collection. Our largest measures 24 x 9 mm., and a Recent specimen in the writers collection measures 32.5 x 12 mm. When these measurements are considered, the statement of F.A. Schilder (Proc. Mal. Soc. Lon., 20,1932,p.54) that catalinensis is " evidently the young of loebbeckeana Weinkauff" would seem palpably erroneous."

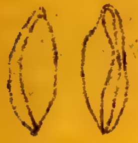
It is the personal opinion of John Q. Burch that catalinensis is a valid subspecies of loebbeckeana, but that the Monterey and northern records of it are probably typical loebbeckeana.

Dr. A. Myra Keen comments " N. barbarensis was reported at Monterey by Berry in Nautilus, vol. 21,1907, but probably his later description of catalinensis cancels this r record.

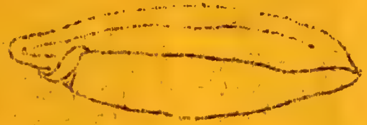
Neosimnia inflexa (Sowerby),1832. Conch. Illust., part 8, fig. 60; described, part 131,1837, p.20. Dr. Keen writes " I am transcribing Weinkauff's quotation of the original. The original was in English which Weinkauff translates to Latin); " Testa oblonga, subcylindracea, laevigata, pallida, extremitate superiori subrostrata, rostro inflexo; apertura inferne subeffusa; labrum incrassatum,columella intus carinata,superne uniplicata. Long. 16, diam. 6 mm." Weinkauff cites the locality as Gulf of Dulce (Cuming). He calls attention to the similarity of this with variabilis."

Range: Monterey, Calif. to Panama. N. variabilis(C.B. Adams)1850 in synonymy. Stanford collection sets from Pt. Abreojos to Gulf of Calif.

Collecting data: Monterey, Calif. on gorgonian (Burch); San Hipolito, L.C. and Taboga Island, Panama (Lowe).



Original figures



from Schilder,1932, pl.5, fig.61

Neosimnia vidleri (Sowerby),1881. Dr. A.M. Keen states regarding this species " The description and original illustration are c opied in Oldroyd; however, her figure 8 is inverted. In line 3 of the description, " Antivelavior" should be " antice latior."The type locality is Monterey, west coast of America."

Reported from San Pedro by Lowe. Dr. H.R. Hill is of the opinion that this species equals avena.

Dr. A.M. Keen reports that the specimens in the Stanford Collection range Monterey to Sonora,Mexico.

Neosimnia avena (Sowerby),1832. Conch. Ill., pt.8, fig. 59; described, pt. 131, 1837, p.20 (fide Sherborn). Description not quoted by Weinkauff (see note a bove). Weinkauff's description, however, is : " O. testa oblongo-ovata,extremitatibus parum productis gibboso,spiraliter subtile striata, rubra; apertura latiuscula, inferne dilatata; columella medio convexa tenuissime labiata; intus albido-lirata,superne uniplicata,inferne angustata, intus excavata,basi acuminata; labrum incrassatum, laevigatum, pallidior, extus marginatum; sinus oblique et modice emarginati. Long. 11, diam. 4.3 mm."

(con.)

'The type locality apparently is Conchaqua (Cuming). Weinkauff figures avena (p. 210, pl. 53, figs. 5,8) and cites O. neglectum " Reeve" (Conch. Icon. pl.14, fig.62), which should be of Adams, in synonymy."

Collecting data: Bahia de Adair, Sonora (E. Huffman); San Felipe, L.C. (Lowe): sets in Stanford collection range from San Diego to Panama.

Range: Monterey,Calif. to Panama.

Neosimnia rufa (Sowerby),1832. Conch. Ill. pt. 8, fig. 58; described, pt. 131,1837, p. 19. Weinkauff's latinization of Sowerby's original description: " Testa oblonga, extremitatibus subproductis, postico acuminato, rufa; apertura angusta, inferne dilatata; columella longitudinaliter depressa lirata,superne uniplicata. Long. 9, diam. 4 mm."

Orig.

Schilder

The type locality is Bay of Caracas on the West Coast of South America (i.e.,Manta,Ecuador). Weinkauff figures it (p. 213, pl. 53, figs. 13,16) and places O. lividum Reeve (Conch. Icon. pl. 14, fig.63,1865) in synonymy. Schilder confirms this synonymy."

Range: California to Ecuador.

There are specimens in the Stanford Collection from the Galapagos.

Neosimnia aequalis (Sowerby),1832. Conch. Illust., pt. 8, fig.61; described pt. 131,1837, p.20. Weinkauff's latinization of the original description: " Testa oblonga, subcylindracea, rubra, extremitatibus obtusis; apertura latiuscula, aequalis; columella intus carinata; labrum incrassatum." Type locality, Panama (Cuming).

Orig.

Collecting data: Sets in the Stanford collection ranging from San Pedro, Calif. to Panama. Dr. A. Myra Keen writes " I find that the most abundant species in our collection is aequalis (mostly labelled variabilis , which is supposed to be a synonym of inflexa). There are sets labelled aequalis from the Gulf of California in the Lowe collection in the San Diego Museum.

However, Dr. H.R. Hill is disposed to place this species in the synonymy of inflexa.

Schilder,pl.5,fig.65

Dr. Dall in Bulletin 112 and followed by Mrs. Oldroyd and others listed the species acicularis Lamarck,1811 and uniplicata Sowerby,1848. Dr. A. Myra Keen advises on these as follows:" .. both should be stricken from West Coast lists, as both are Caribbean species. Obviously we have plenty of West Coast names to cope with without importing anything from the other side of the continent. "

In the discussion of adopting the above classification the following note from Dr. A. M. Keen is of interest: " I should advise adopting Schilder's classification, as Mr. Strong does. Although Schilder was sometimes guilty of hasty conclusions, excusable considering the size of the group with which he was working, his classification in the main seems sound. I have rearranged our Cypraeidae to conform to his scheme and find that it facilitates the identification of unknown material. That seems to me a good test of workability."

Family Pediculariidae

Genus Pedicularia Swainson,1840. Type, Pedicularia sicula Swainson. " Shell small, limpet-like, irregular, with small, short spire concealed with the growth, and a radiately ribbed surface when young; mouth large, lip simple, irregular. Operculum none." (Tryon, S. & S. Conch.).

Pedicularia californica Newcomb,1864. Farallones to Monterey, Calif. The type locality is: " California, from a coral growing on a monster crustacean of the genus Echidnocerus from deep water at the Farallon Islands."

Collecting data: Monterey, Calif. (Button). (San Diego Museum).

Family Cypraeidae

Genus Zonaria Jousseaume,1884. Type Z. zonaria Gmelin,1791 -(zonata Lamarck,1810)

In accord with the discussion under Amphiperatidae above, we have elected to follow Schilder " Prodrome of a Monograph on Living Cypraeidae", Proc. Mal. Soc. London, vol. 23, part 4, march,1939. Dr. phil. F.A. Schilder and Dr. phil. nat. M. Schilder.

Subgenus Neobernaya Schilder,1927. Type (orig. desig.) Zonaria spadicea(Swainson).

Zonaria spadicea (Swainson),1823. Monterey, Calif. to Cerros Island, L.C. Type locality, California.

Collecting data: Dr. A.M. Keen advises " The northernmost record for spadicea is Monterey Bay; the late Mrs. Fackenthall collected a single living specimen there years ago.". Cambria, San Luis Obispo Co. (Wilcox); Our experience has been to find spadicea a very rare species north of Los Angeles county. It is rather abundant from Santa Monica Bay south to Todos Santos Bay, L.C. We have taken it in the estuaries as well as along the open surf. The bathymetric range indicates that it is a shallow water species although we have brought it up from as deep as 25 fms. off Catalina Island (Burch); Boca la Playa, mouth of Santo Tomas River, L.C. (Huey); End of Point Loma and Mission Bay (Wilson); La Jolla (Mills); Del Mar (Robbins); Laguna Beach (Sharkey); San Pedro (Lowe) (San Diego Museum).

The following keys and list of species from Mr. A.M. Strong's notebook should be of interest.

Family Cypraeidae

Surface ribbed .... Trivia
Surface pustulate .... Pustularia
Surface smooth
. Aperture the full length of the shell .... Cypraea
. Aperture shorter than the shell .... Erato

Genus Cypraea

Shell cylindrical
. Back with 4 obscure lead colored bands,surface spotted
Length 75 mm Gulf of Calif. to Peru .... cervinetta
Reeve sp.6; Tryon, vol.7, p. 164, pl.2,figs. 13 and 14
. Back with irregular dark lines, ends orange spotted
Length 40 mm. Gulf of Calif. to Socorro Id. ...... mexicana
Proc. U.S.N.M. vol.16, p.348

(con.)

Shell ovate, with a flattened base
. Closely reticulated with brown, margins black spotted
Length 40 mm. Gulf of Calif. to Peru .... aribicula
Reeve, fig.60; Tryon, vol.7, p. 175, pl.9, figs. 35 & 36
Shell pyriformly ovate
. Shell marginated
.. Margins obscurely pitted
... Back fulvous, with white occellated spots
Length 30 mm. Gulf of Calif. to Galapagos .... albuginosa
Reeve, fig.94; Tryon, vol.7,p.193, pl.18, figs. 98 & 99
.. Margins not pitted
... Back closely, unequally, chestnut spotted
Length 50 mm. Gulf of Calif. to Peru .... annettae
= sowerbyi of Reeve. Tryon, vol.7, p. 185, pl.15, fig.9
... Back freckled with chestnut, more globose
Length 40 mm. Gulf of Calif. to Peru .... robertsi
= punctulata Gray Reeve fig.61; Tryon vol.7,p.186,pl.15,figs. 28,29
. Shell not marginated
.. Back chestnut, sides livid, unspotted
Length 50 mm. Monterey to Cerros Island .... spadicea
Oldroyd 2-2-237
.. Back freckled with pale brown, sides black dotted
Length 40 mm. Panama to Peru .... nigropunctata
Reeve fig. 59; Tryon vol.7, p. 185, pl.15, fig.18 & 19

Cypraea spadicea Swainson,1823.	Monterey to Cerros Island
Cypraea annettae Dall,1909.	San Ignacio Lagoon to Peru
Cypraea cervinetta Kiener,1845.	Gulf of Calif. to Panama
Cypraea robertsi Hidalgo,1906	Gulf of Calif. to Peru
Cypraea arabicula Lamarck,1810	Magdalena Bay to Peru
Cypraea albuginosa Gray,1824	Gulf of Calif. to Panama
Cypraea isabella mexicana Stearns	Gulf of Calif. to Socorro Island
Cypraea nigropunctata Gray,1828.	Panama to Peru

Family Eratoidae
Subfamily Triviinae

The species involved here were placed by Dr. Dall in Bull. 112 under family Triviidae, genus Trivia Gray,1832. This was followed by Grant and Gale who used type by subsequent designation Gray,1847, Cypraea europea Montagu = (Voluta jonensis Pennant). However, Dr. A. Myra Keen advises (Per. Comm. August,1945) " Trivia should be credited to Broderip, 1837 (Penny Cyclopedia, p. 256). The Gray,1832, reference is to unpublished proof sheets. Genotype (subsequent designation Gray,1847), Cypraea europaea Montagu = C. monacha Da Costa,1778. However, Schilder (Fossilium Catalogus, pt. 55,1932), puts our species into the genus Pusula Jousseaume,1884; genotype, fide Schilder, P. radians (Lamarck). Tp the subgenus Pusula s.s., he assigns radians, solandri, sanguinea, and californiana. To Pusula (Dolichupis) he assigns ritteri and the Panamic forms,buttoni and panamensis. The genotype of Dolichupis Iredale,1930 is P. (D) producta(Gaskoin). "

We propose to follow Schilder's classification.

Another discussion of the proper spelling of the family name was involved. Dr. Joshua L. Baily Jr. states it as follows " Trivia is a Latin name and a family name based upon it would be correctly spelled Triviidae. But Erato is a Greek name. The International Code provides that in cases of non-Latin names the name must be either Latinized or " considered as such if not of clasical origin." But Erato is of classical origin. If treated as a Latin word the family name would be ' Eratonidae' because Latin words ending in -o take and "n" in making compounds. If it is treated as a Greek noun which it is, I do not know what the family name would be."

Genus Pusula Jousseaume,1884. Type, P. radians (Lamarck)- fide Schilder

Pusula radians (Lamarck),1810. Santa Barbara and Catalina Island, Calif. to Ecuador. Type locality, Acapulco, Mexico.

Collecting data: Mazatlan, Mex. (Lowe); Santa Elena Bay,Ecuador (Lowe). We have specimens from Panama and west Mexico (Burch).

Pusula solandri (Sowerby),1832, ex Gray MS. Conch. Illust. pt.7, fig.43; described in pt. 131,1837, p.14 (description copied in Oldroyd but wrongly attributed to Gray). Type locality, Pacific Ocean.

Collecting data: Terminal Island; Balboa; Corona del Mar; Dana Point; Newport Bay; San Diego; Pt. Vicente; an interesting collecting note seems to be that this species is in our experience more nearly littoral than californiana. We have dredged the latter at considerable depth but never solandri beyond very shallow water. (Burch). Mulege, L.C. (Huey); Cedros Island and La Paz and numerous localities in the Gulf of California (Lowe) (San Diego Museum).

Range: Catalina Island, Calif. to Panama.

Pusula sanguinea (Sowerby),1832, ex Gray MS. Conch. Ill., pt.6, fig.32; described, pt. 131,p. 13 (p. 12 in Stanford copy): " Shell ovate, dark purplish brown, with a dark crimson blotch on the back, dorsal line short, its ends whitish; ribs rather distant, smooth,lighter coloured: length 0.45, breadth 0.30." Type locality, Panama and Mexico.

Range: Catalina Island to Peru.

Collecting data: Gulf of Calif. (Button); Puerto Angel, Oaxaca (Orcutt); La Paz, L.C. (Baker); Mazatlan (Lowe); Panama (Anderson) (San Diego Museum).

Pusula californiana (Gray),1828. Crescent City,Calif. to West Mexico. Type locality, California.

Collecting data: By far the most common species in our fauna. We have it from a great many localities from littoral down to as deep as 40 fms. off Monterey. Common off Redondo Beach, Calif. in 25 fms. gravel. In washed in kelp holdfasts along beach from Long Beach south; in algae in the Estero below Ensenada,Mexico; littoral at Dana Pt.,La Jolla, San Onofre etc.(Burch). Anchor Bay, Mendocino Co. coast (Chaces); Punta Penasco, Sonora (Lowe); Magdalena Is.,L.C. (Orcutt); Catalina Island (Lowe); La Jolla (Bristol and Beckwith).

Subgenus Dolichupis Iredale,1930. Type, P. (D) producta (Gaskoin).

Pusula ritteri (Raymond),1903. Monterey, Calif. to Cortez Bank. Type locality, off Catalina Island in 60 fathoms.

Grant and Gale state " This rare, white species is obtained only by dredging. The ribs are continuous across the back, the species differing in this respect from T. californiana. T. sanguinea .. with which ritteri was formerly confused, is dark colored and the ribs are interrupted somewhat across the back. T. californiana has fewer and coarser ribs than either ritteri or sanguinea."

Collecting data: Dredged off Redondo Beach,Calif. in 25 fms. gravel bottom; also Pleistocene of Timm's Pt.,San Pedro (Burch); Catalina Island in 50 fms. (Lowe): 40 fms. White's Landing,Cat. Id. (Strong).

The following key and list of species from Mr. A.M. Strong's notebook will be of interest. Mr. Strong used the generic name *Trivia* .

Genus *Trivia*
Shell with a dorsal groove interrupting the ribs
. Ribs tuberculate at the dorsal extremity
.. Teeth of outer lip twice as numerous as the ribs
Length 19 mm. Catalina Island to Panama............ *solandri*
Oldroyd 2-2-238; Reeve, fig. 113
.. Teeth of outer lip not exceeding the ribs in number
Length 22 mm. Santa Barbara to Ecuador .... *radians*
Oldroyd 2-2-237; Reeve, fig. 117
. Ribs not tuberculate
.. Ribs fine, numerous, rather wrinkled
Length 10 mm. Gulf of Calif. to Panama .... *pacifica*
Reeve, fig. 143; Tryon vol.7,p.201,pl. 21,figs. 3 & 4
Shell with an impressed dorsal line not interrupting the ribs
. Shell ovate
.. Sides not dilated, ribs rather distant
Length 12.mm. Farallones to Mexico .... *californiana*
Oldroyd 2-2-238; Reeve fig. 128.
.. Sides dilated, ribs fine and numerous
Length 14 mm. Catalina to Peru .... *sanguinea*
Oldroyd 2-2-239; Reeve 127
.. Right side slightly thickened,ribs very fine
Length 10 mm. Gulf of Calif. to Galapagos .... *fusca*
Reeve fig. 134; Tryon vol.7, p. 203
. Shell pyriformly ovate, right side marginated
Length 18 mm. Galapagos .... *maugeri*
Reeve fig. 119; Tryon, vol.7,p. 203,pl.22,figs. 23 & 24
. Shell somewhat globular
.. Ribs rather thick, prominent but not crowded
Galapagos to Ecuador .... *acutidentata*
Tryon vol.7, p. 207
.. Ribs about 18, strong, smooth
Length 3.2 mm. Panama .... *atomaria*
Bull. Mus. Comp. Zool. vol.43, p.323,pl.12, figs. 8,9,11.
Shell without dorsal groove or impressed line
. Both ends somewhat produced
Length 7 mm. Gulf of Calif. to Galapagos .... *pulla*
Reeve, fig. 150; Tryon, vol.7, p. 206, pl. 23, figs. 55 & 56
. Anterior end slightly produced
Length 12 mm. Monterey to Cortez Bank .... *ritteri*
Oldroyd 2-2-238
. Ends not produced
.. Ribs coarse, wide spaced
Length 4.2.mm Panama ....*panamensis*
Bull. Mus. Comp. Zool. vol.43, p. 323, pl. 12, fig. 7,9,12
.. Ribs fine, columella sharply angled
Length 10 mm. Gulf of Calif. to Panama .... *rubescens*
Reeve, fig.141; Tryon vol. 7,p. 204, pl.23,figs. 44 & 47.

Trivia solandri (Gray),1832	Catalina to Panama
Trivia californiana (Gray),1828.	Farallones to Mexico
Trivia sanguinea (Gray),1832	Catalina to Peru,
Trivia radians (Lamarck),1810	Santa Barbara to Ecuador

(con.)

Trivia ritteri Raymond,1903.	Monterey to Cortez Bank
Trivia fusca Gray in Sby. 1832	Gulf of Calif. to Galapagos
Trivia pacifica (Gray),1833	Gulf of Calif. to Panama
Trivia pulla Gaskoin,1846.	Gulf of Calif. to Galapagos
Trivia rubescens (Gray),1832	Gulf of Calif. to Panama
Trivia panamensis Dall,1902.	Nicaragua,Panama and Galapagos
Trivia atomaria Dall,1902.	Panama
Trivia galapagensis Melvill	Galapagos
Trivia acutidentata Gaskoin,1835.	Galapagos and Ecuador
Trivia maugeri (Gray),1833	Galapagos

Subfamily Eratoinae

Genus Erato Risso,1826. Dr. A.M. Keen advises " The genotype of Erato is E. cypraeola (Brocchi). Schilder (Fossilium Catalogus, pt.55,1932, p.83) names a new subgenus, Hespererato and designates Erato vitellina Hinds as type."

" This genus differs from Cypraea in that the spire is not entirely obscured by the extension of the aperture" (Grant and Gale, p. 754).

The following two keys and list of species from Mr. A.M. Strong's notebook will be of interest. We will then take up a detailed discussion of the species reported north of San Diego.

Genus Erato

Spire elevated
. Lip somewhat thickened, shell livid or reddish
  Height 10 mm. San Francisco to Mexico .... vitellina
. Lip swollen in the middle, shell violet lead color
  Height 10 mm. Gulf of Calif. to Peru .... scabriuscula
  Reeve fig.4; Tryon vol.5,p.11, pl.4, fig. 56.
. Lip swollen, somewhat varicose, shell flesh color
  Height 5 mm. Monterey to Panama .... columbella
Spire low, more or less covered
. Aperture wide, shell whitish, thin
  Height 15 mm. Santa Rosa Island to Gulf of Calif. ... albescens
. Aperture narrow, shell pale olive green
  Height 3.2 mm. Panama .... oligostata
  Bull,. Mus. Comp. Zool. 43, p. 324,pl.11, fig.8.

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West Coast Species in the Subfamily Eratoinae
Adapted from Schilder in Proc. Mal. Soc.- July,1933

Fossula distinctly concave
. Terminal ridges and anterior columellar teeth radial ..... Erato
.. Second terminal ridge oblique, stronger than first ......(Eratopsis)
... Dorsum granulated on spire and body whorl
  Length 3.1 to 3.3 mm. Panama .... oligostata
Fossula obsolete or nearly so .... Hespererato
. Columella and fossula smooth interiorly
.. Labial teeth more than eleven
... Extremities unspotted but often deeper colored
.... Breadth less than 70% of the length of the outer lip
  Length 4.2 mm. Central America .... marginata
.... Breadth more than 70% of the length of the outer lip
  Length 3.7 mm. Galapagos Islands .... galapagensis
... Extremities vividly spotted
  Length 5.9 to 6.9 mm. California to Panama .... columbella

(con.)

.. Labial teeth less than eleven
... Shell reddish-brown, solid
Length 11.7 to 13.0 mm. Bodega Bay to San Diego ..... vitellina
... Shell white, subpellucid
Length 13.5 mm. Santa Barbara to La Paz .... albescens
. Columellar teeth crossing the interior of the columella
Length 6.8 to 7.9 mm. America .... scabriuscula

oligostata Dall,1902.	p. 268. Gives a description.
marginata Morch,1860.	p. 267, unfigured. States he has seen no specimens and the type is not preserved in the Museum of Copenhagen.
galapagensis Schilder,1933.	p. 264, fig.46. Described as a variety of marginata. Says " seems to differ in relative breadth and callosity only". (Probably equals E. maugeriae Gray of west coast authors in Galapagan lists. A.M.S.).
columbella Menke,1846.	fig. 47-48. E. leucophaea Gould,1852 is a synonym. E. panamensis Carp.,1856, is given by Tryon as a synonym but is stated by Smith to belong to E. voluta, a fossil. (Described as ? var. of maugeriae and is probably an older name for marginata. A.M.S.)
vitellina Hinds,1844.	Fig. 49
albescens Dall,1902.	p. 259, unfigured. Gives as a deepwater form of vitellina.
scabriuscula Sowerby,1832.	p. 271, fig. 51. Describes the granulated surface. E. granum Kiener and E. cypraeola Sby. (not Brocchi) are synonyms.

Erato vitellina Hinds,1844.	Bodega Bay to Magdalena Bay.
Erato columbella Menke,1847.	Monterey to Panama
Erato albescens Dall,1905.	Santa Rosa Island to La Paz
Erato scabriuscula Gray,1832.	Gulf of Calif. to Peru
Erato marginata Morch,1860.	Gulf of Calif. to Panama
var galapagensis Schilder,1933	Galapagos
Erato oligostata Dall,1902.	Panama

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Genus Erato Risso,1826
Subgenus Hesperato Schilder,1932

Erato vitellina Hinds,1844. Bodega Bay and Farallone Islands south to Magdalena Bay, L.C. Type locality, Magdalena Bay.

Collecting data: A fairly common species in our experience from the littoral down to below 40 fathoms. We have it from many localities: Monterey; Cayucos; dredged off Santa Monica, Catalina Island and Redondo Beach, most common around 20 to 25 fathoms; taken living littoral on Balboa breakwater, Dana Point, San Onofre, Terminal Island, La Jolla, San Diego; living in numbers in the bryozoan growth on the bait tanks off Santa Monica; in holdfasts washed in along the coast down to below San Diego. (Burch). La Jolla to Monterey (San Diego Museum).

Erato albescens Dall,1905. Off Santa Rosa Island, Calif. to La Paz, L.C. Type locality, Fish Commission station 4431, which we are informed by Dr. A.M. Keen is 30-41 fms. off western Santa Barbara Islands, Calif.

As stated above Schilder considers albescens a subspecies of vitellina. However, Mr. A.M. Strong who has dredged specimens from 30-40 fms. off White's Landing, Catalina states that albescens is a decidedly different shell in form and is a good distinct species in his opinion.

Erato columbella Menke,1847. Monterey, Calif. to Panama Bay.
Type locality, Mazatlan, Mexico.

Collecting data: We have found this not an uncommon shell. We dredged it off Monterey, Calif. on the shale off Del Monte in 20 fms.; off Redondo Beach in gravel at 25 fathoms, common; numbers taken from the roots of eel grass at Dana Point, Orange Co.; not uncommon in holdfasts washed ashore all along the coast; littoralat Punta Banda, L.C. (Burch); Mazatlan (Lowe); San Hipolito Point, L.C. (Hemphill); So. Coronado Island (Baker); Catalina Island in 50 fms. (Lowe); Newport Beach and San Pedro (Lowe); La Jolla (Bristol and Brier) (San Diego Museum of Natural History).

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George Willett

The many friends of George Willett, Curator of Ornithology and Mammalogy at the Los Angeles Museum, were greatly stunned when they learned of his death in Los Angeles on August second.

Born in Hawkesbury,Ontario,Canada on May 28th,1879, Mr. Willett moved to California in his early years and attended Whittier College from 1896 to 1898. The Spanish American war interrupted his education and he joined the Service, serving in the Philippine camapign. At the close of the war, he joined the Los Angeles Police force, where he was employed until time of retirement. In 1912, he was appointed a Reservation Inspector for the U.S. Bureau of Biological Survey and spent six years in the field, the last four years being stationed at Forrester Island, Alaska. World War I found him in Military Service again and he was at a training camp in this country when the Armistice was signed.

Returning to Alaska, a second time as U.S. Marshall, he remained in the vicinity of Ketchikan until his return to California in 1927 to accept the position of Assistant Ornithologist at the Los Angeles Museum. One year he was appointed Curator of Ornithology and Mammalogy.

As a boy, Mr. Willett loved nature in all it's aspects. Down through the years, because of his extensive travels, he had a wonderful opportunity to study animals in their native surroundings. He accumulated a great amount of knowledge concerning the structure and habits of birds, mammals and mollusks of the west and shared his knowledge with others, by word of mouth or through publications. Friendship with scientists the world over was also a potent factor in his development and he received much help and encouragement from many well known leaders in the branches of Natural History in which he was interested.

Mr. Willett was an accurate observer, a tireless collector and a careful writer. He was regarded as an authority by the rank and file of his colleagues. In recognition of this scholarship, a number of new species of animals were named in his honor. Some of these animals he himself had discovered. Many west coast mollusks were first described and named by him. The type specimens of these are deposited in the Reference Collections of the Los Angeles Museum.

The Cooper Ornithological Club of Southern California played an important part in the latter years of his life. For it was here that he found many lasting friendships. He was a Past President of this organization and was a member of its Board of Governors.

The Conchological Club of Southern California was another club in which he took an active interest, and he was scarcely ever absent from its meetings. He had been President several times in the past and was President at the time of his death.

(con.)

His curatorship at the Los Angeles Museum was eminently successful, and he was greatly admired and respected by his associates. His genial disposition and helpful attitude won for him the friendship of his fellow workers and the appreciation of those who came to him for advice and information. Especially will he be missed by the younger generation. The kind, personal instruction that he gave the high school boysand girls who attended his Saturday morning classes at the Museum, will long be remembered and there are some who owe their scientific career to his leadership and training.

There were three outstanding contributions which Mr. Willett made toward the development of the Museum's Collections of Natural History. These were extensive field trips which netted many valuable specimens to the Museum. In 1932-1933 as a guest of Dr. Herbert N. McCoy, he travelled through Guatemala and in 1936 visited parts of southeastern Alaska. At different times during the period between 1939 and 1941, he was a member of the Museum's Channel Island Survey staff which was engaged in biological studies and collections on the various islands off the coast of southern California. A dredging trip to the Gulf of California and intensive collecting at near by points resulted in a large amount of material being added to the Collections.

During his second sojourn in Alaska, Mr. Willett met and married Ora A. Bellah of Ketchikan, who likewise had a deep love of nature. Through their many happy years of married life, Mrs. Willett was an inspiration to him and a faithful companion and helper on his frequent collecting trips.

Mr. Willett was a vice-president of the American Ornithological Union and held membership in the following scientific societies besides those heretofore mentioned: Northwest Bird and Mammal Society, California Academy of Sciences, Southern California Academy of Sciences, Biological Society of Washington, American Society of Mammalogists, Society of Vertebrate Paleontology, and the San Diego Society of Natural History.

Besides the widow, Mr. Willett is survived by a son, George Willett Jr. of Oregon, the issue of a former marriage, a sister Mrs. Walter Trager of Paso Robles and a brother Fred H. Willett of Mentone, California. His funeral was held on August 7th and he was buried with military honors at the National Wat Veteran's Cemetery at Sawtelle, California.

Appended is a list of the type specimens of mollusks described by him and a complete bibliography of his writings.

Artcles on Natural History by George Willett

1895- The Mexican Raven in California. (Oologist xii,1895, p.110).
1906- Eggs of the Sage Grouse (Condor viii,1906,p.75)
Peculiarities of Ducks in Nesting. (Condor viii,1906,p.75)
" The Southern California Clapper Rail Breeding on Fresh Water (Condor viii,1906,p. 151.)
1907- Summer Birds of a Prairie Lake.(Condor ix,1907, p.105)
1908- Common Tern and Ruddy Turnstone in Southern California. (Condor x, 1908,p.50).
Summer Birds of the Upper Salinas Valley and Adjacent Foothills. ((Condor x,1908, p. 137).
1909- Bird Notes from the Coast of San Luis Obispo County (Condor xi,1909,185)
1910- Additions to Grinnell's List of Birds of the San Bernardino Mountains (Condor xii, 1910, p.44)
Rodger Fulmar in Southern California (Condor xii, 1910, p.46).
A Summer Trip to the Northern Santa Barbara Islands (Condor xii,1910, p.170).
A Southern California Spring Record for the Common Tern.(Condor xii, 1910, p.174)

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Red Phalarope in Southern California in Winter.(Condor xii,1910,p.175).
Southern California Breeding Records of the Western Grasshopper Sparrow. (Condor xii,1910, p.205)
1911- The Blue-winged Teal in Southern California.(Condor xiii,1911,p.76).
(With Antonin Jay) May Notes from San Jacinto Lake.(Condor xiii,1911, p. 156).
1912- Birds of the Pacific Slope of Southern California.(Pacific Coast Avifauna 7,1912.)
Some 1912 Spring Notes from Southern California. (Condor xiv,1912,p.194)
Report of Birds of the St. Lazaria Birds Reservation,Alaska.(Bird Lore, 1912,p. 419)
1913- Bird Notes from the Coast of Northern Lower California.(Condor xv, 1913, p. 19)
Pelagic Wanderers .(Condor xv,1913, p.158).
1914- Birds of Sitka and Vicinity, Southeastern Alaska (Condor xvi,1914,p.71)
Peculiar Death of California Bush-tit.(Condor xvi,1914,p.168)
Unusual Abundance of Glaucous-winged Gulls on the Coast of Southern California (Condor xvi,1914, p.183).
1915- New Winter Records for Arizona.(Condor xvii,1915,p.102).
Summer Birds of Forrester Island,Alaska.(Auk xxxii,1915,p.295).
1917- Further Notes on the Birds of Forrester Island,Alaska.(Condor xix,1917, p.15)
Birds of East Park Bird Reservation,California.(Reclamation Record, 1917, p.33).
Birds of Rio Grande Bird Reservation,New Mexico.(Reclamation Record, 1917, p.190)
Notes on Some Mollusc-eating Birds. (Lorquinia II,1917, pp. 33-34).
1918- Bird Notes from Forrester Island, Alaska. (Condor xx,1918,p.85).
A Peculiarity of Plumage in Some Specimens of Heermann Gull.(Condor xx,1918, p. 122)
Description of a New Pandora of the Subgenus Kennerleyia.(Nautilus xxxi,1918, p.134).
Notes on the Mollusca of Forrester Island,Alaska. (Bivalves).(Nautilus xxxii, Oct.1918, pp. 65-69).
1919- Notes on the Nesting of Two Little Known Species of Petrels (Condor, xxi,1919, p.60).
Some Notes from San Diego County, California (Condor xxi,1919,p.126).
Mollusca of Forrester Island, Alaska, Univalves (with description of one new species, Velutina rubra)(Nautilus xxxiii,1919,pp.21-28).
Bird Notes from Southeastern Oregon and Northeastern California (Condor xxi,1919, pp 194-207).
1920- Additional Notes on the Avifauna of Forrester Island,Alaska (Condor, xxii, 1920, pp. 138,139).
Comments upon the Safety of Sea Birds and upon the " Probable" occurance of the Northern Bald Eagle in California (Condor xxii,1920, pp. 204,205.)
1921- Ornithological Notes from Southeastern Alaska (Auk xxviii,1921,pp 127, 129)
Bird Notes for 1920 from Southeastern Alaska (Murrelet,II,1921,pp.7-11)
Distribution of the Townsend Fox Sparrow (Condor xxiii,1921,pp.36,37).
Mammal Notes from Wrangell,Alaska (Murrelet II,1921,pp.17,18).
Bird Notes from Southeastern Alaska (Condor xxiii,1921,pp.156-159)
1923- Comments on Bent's Life Histories (Condor xxv,1923,p.25).
Bird Records from Craig,Alaska.(Condor xxv,1923,p.105)
1927- Notes on Occurence and Distribution os some Southeastern Alaskan Birds (Condor xxix,1927, p.58).

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Destruction of Eagles in Alaska (Auk. xliv,1927,p.591).

1928- Gulls (L.A. Employee, I, 1928, pp. 10,11,24)

Notes on Some Birds of Southeastern Alaska (Auk xlv,1928,pp.445-449).

Notes on Some Pacific Coast Acteocinas (Nautilus xlii,1928,pp.37,38.)

1929- Description of Two New Species of Molluscs from the West Coast of North America (Nautilus xliii,1929,p.26).

Description of Two New Land Shells from Southern California (Bull. So. Calif. Acad. Sci. xxviii, part 2,1929,p.17).

1930- Least Bittern in California in Winter (Condor xxxiii,1930, p.64).

The Micrariontas of the indioensis Group, with the Description of a New Subspecies (Nautilus xliii, p. 115).

Notes on Micrarionta rixfordi (Bull. S. Calif. Acad. Sci. xxix,1930, p.15).

Desert Helicoids of the Micrarionta hutsoni Group (Nautilus xliv,1930, 1930, pp.4-6).

The Common Mynah Breeding in Los Angeles (Condor xxxii,1930,pp 301,302)

1931- The Condor in San Benito County, California (Condor xxxiii,1931,p.31).

Two New Helicoids from the Mohave Desert,California (Nautilus xliv,1931, pp. 123-125).

Third Ten Year Index to the Condor (P.C. Avifauna,No.20).

Three New Mollusks from Catalina Island,California. (Nautilus xlv, 1931, pp 65-67).

Psephis (Petricola) tellimyalis (Cpr.) Not the Young of Petricola denticulata Sby. (Bull. S. Calif. Acad. Sci. xxx,1931, p.39).

1932- A New Chiton from Southern California (Nautilus xlv,1932,p.101).

A New Helminthoglypta from Monterey County,Calif.(Nautilus xlv,1932, pp 134-135)

A New Cardita from the Aleutian Islands and a New Epitonium from Southern California (Trans. San Diego Soc. Nat. Hist. vii,1932,p185-90)

Sanderlings and Turnstones at Salton Sea,Calif.(Condor xxxiv,1932,p.228)

1933- A Revised List of the Birds of Southwestern California (Pac. Coast Avifauna, no.21,1933, 204 pp.)

1934- Two New Cingulas from Alaska (Nautilus xlvii,1934,p.103)

The Plain Titmouse of Northern Santa Barbara County,California (Condor xxxvi,1934, p.86).

Additional Fall and Winter Records for the Lutescent Warbler in California. (Condor xxxvi, 1934, p. 114).

The Lower California Say Phoebe in Southwestern California (Condor xxxvi, 1934, p.117).

(With Hildegarde Howard) Characters Differentiating Certain Species of Stercorarius (Condor xxxvi,1934,pp. 158-160)

Spring Notes from Mount Pinos, Kern County, California (Condor xxxvi, 1934, p.178).

A New Helminthoglypta from the East Slope of the Sierra Nevada,California (Bull. S. Calif. Acad. Sci. 33,1934,pp. 57-58).

1935- A New Kangaroo Rat from Northeastern California (Journ. Mam.16,1935, pp. 63-64)

Further Notes on the Desert Snails of Riverside County,California.(Descriptions of M. granitensis and M. mccoiana) (Bull. S. Calif. Acad. Sci. 34,1935,pp. 1-2).

Three New Micrariontas from the Central Colorado Desert,California (M. brunnea,chuckwallana,chocolata) (Nautilus,49,July,1935,pp 14-16).

Some SuperfluousNames in West American Chitons (Nautilus 49, Oct.1935 pp. 42-44)

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1937- Summer Tanger at Wilmington, Los Angeles County (Condor 39, Jan. 1937, p. 39).

Buccinum baeri morchianum (Fischer) not a Tenable Name (Nautilus, 50 p. 101).

Dipodomys deserti sonoriensis in Arizona (Journ. Mamm. 18, 1937, p. 101).

Micrariontas of the Southwestern Colorado Desert (Description of M. carrizoensis, M. remota) (Nautilus 50, 1937, pp. 122-125).

A New Land Shell from the Riversi e Mountains, Colorado Desert (Micrarionta immaculata) (Bull. S. Calif. Acad. Sci. 36, 1937, pp. 6-7)

Ring-necked Duck in Ventura County, California (Condor 39, 1937, p. 125).

A New Callistochiton from Lower California (C. connellyi) (Nautilus 51, 1937, p. 25).

Off-shore Bird Notes (Red-billed Tropic Bird collected) (Condor 39, 1937, p. 226)

Additions to knowledge of the fossil invertebrate fauna of California (description of Triphora fossilis and Leptothyra subobsoleta) (Bull. So. Calif. Acad. Sci. 36, 1937, pp. 61-64).

An Upper Pleistocene Fauna from the Baldwin Hills, Los Angeles County, California (Trans. San Diego Soc. Nat. Hist. 8, no. 30, pp 379-406).

Report on Pleistocene Molluscan Fauna at Capistrano Beach, Orange Co., California (Bull. So. Calif. Acad. Sci. 36, 1937, pp. 105-107).

1938- Another Saw-whet Owl from the San Bernardino Mountains, California (Condor 40, 1938, p. 87).

Remarks on some West American Mollusks (Nautilus 52, pp. 10-11)

Two New Land Shells from Kern County, California (H. stageri and H. cuyamacensis piutensis) (Bull. So. Calif. Acad. Sci. 37, 1938, 52-54).

A New Pseudochama from Clarion Island, Mexico (Pseudochama clarionensis) (Nautilus 52, 1938, pp. 48-49).

Winter and Spring Gull Records from the West Coast of Mexico (Condor 40, 1938, p. 257).

1939- Another Specimen of Sooty Fox Sparrow from Southern California (Condor 41, 1939, pp. 33-34)

An Extension of the Known Range of Notiosorex crawfordi (Journ. Mamm. 20, 1939, p. 102).

Control of Predatory Birds (Modern Game Breeding, 9, Feb. 1939, pp 12-13)

Remarks on Alaskan Savannah Sparrows (Condor 41, 1939, p. 86).

Description of a New Mollusk from California. (Lamellaria sharoni) (Nautilus 52, 1939, pp 123-124)

Guadalupe Island Xantus Murrelet in California Waters (Condor 41, 1939, p. 121).

Micrariontas of Desert Ranges Bordering the East Side of Coachella Valle and Salton Sink, California (Description of M. orcopia) (Bull. So. Calif. Acad. Sci. 38, 1939, pp. 14-16).

July Records from San Pedro, Calif. (Condor 41, 1939, p. 255).

A New Species of Mollusk from the San Pedro Pleistocene (Alabina effiae) (Bull. So. Calif. Acad. Sci. 38, 1939, p. 202).

1940- A New Land Shell from Lower California (Micrarionta chacei) (Bull. So. Calif. Acad. Sci. 39, pp. 80-82).

A New Ischnochiton from Catalina Island, California. (Ischnochiton catalinae) (Bull. So. Calif. Acad. Sci. 39, pp. 185-186).

1941- Variation in North American Ravens (Auk 58, pp. 246-249).

Faunal Changes in Los Angeles County (Quarterly, L.A. Co. Museum, Oct. 1941, 19-23).

California Desert Land Snails (Min. Conch. Club So. Calif. Nov. 1941)

1942- Common Birds of the Los Angeles County Coast (L.A. Co. Museum, Science Ser. 5, Zool. Publ. 1, Sept. 29, 1942).

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1943- Common Birds of the Los Angeles County Mountains (L.A. Co. Museum, Science Ser. 6, Zool. Publ. 2, Jan. 15,1943).
Another Southern California Record for the Tennessee Warbler (Condor 45, 1943, p.74).
Review of " Joseph Grinnell's Philosophy of Nature" (Condor 45,pp.80-83).
(With H.S. Swarth) Ten Year Index to ' The Auk', published by the American Ornithologists Union,1943,pp. 1-374.
The Birds of the Urban Districts of Los Angeles County No.1 (L.A. Co. Museum, Sci. Ser. 7, Zool. Publ.3, Aug.1943).
Elephant Seal in Southeastern Alaska (Jour. Mammalogy 24,p 500, 1943).
Northwest American Species of Glycymeris (Bull. So. Calif. Acad. Sci. 42, pp. 107-114,1943 (Jan. 15, 1944).
1944- Two New West American Pelecypods (Cardita hilli; Chione picta) (Bull. So. Calif. Acad. Sci. 43, pp. 19-22).
Review of Herbert Brandt's " Alaska Bird Trails" (Condor 46,pp. 247-248)
Age of a Red-vented Bulbul (Auk. 61, pp 645-646,1944).
New Species of Mollusks from Redondo, California (Nuculana burchi, Volvulella tenuissima, Philine californica, Melanella rosa) (Bull. So. Calif. Acad. Sci. 43, pp. 71-73, 1944).
Mammals of Los Angeles County, California (L.A. Co. Mus. Sci. Ser. 9, Zool. no.4, Oct.,1944).
1945- The Type of Telespiza ultima Bryan (Auk. 62, p.139,1945).
The Acteocina of Salton Sink, Colorado Desert, California (Bull. So. Calif. Acad. Sci. 44 (1), pp. 28-29.)
Biography of Herbert N. McCoy (Condor 47, 1945, pp. 174-175).
Does the Russet-backed Thrush have Defective Eyesight (Condor,47,no.5)

Willett Types in the Los Angeles County Museum

Museum No.

1015- Acteocina culcitella intermedia
1016- Turbonilla cayucosensis
1017- Leptothyra engbergi
1018- Micrarionta ora
1019- Turbonilla strongi
1020- Pecten catalinensis
1022- Micrarionta indoensis cathedralis
1023- Micrarionta hutsoni unifasciata
1024-Micrarionta hutsoni hilli
1025- Mopalia pedroana
1028-Trophon albospinosus
1029- Micrarionta hutsoni amboiana
1030- Helminthoglypta reediana
1031- Helminthoglypta greggi
1034- Venericardia aleutica
1036- Epitonium pedroanum
1037- Cingula eyerdami
1038- Cingula forresterensis
1039- Helminthoglypta caruthersi
1040- Micrarionta chuckwallana
1041- Micrarionta chocolata
1042-Micrarionta brunnea
1043- Micranionta granitensis
1044- Micrarionta mccoiana
1046- Rochefortia reyana
1047- Bornia cooki
1048- Callistochiton connellyi
1049- Micrarionta harperi carrizoensis
1050 Micrarionta indioensis remota
1051- Micrarionta immaculata
1053- Triphora fossilis
1054- Leptothyra subobsoleta
1055- Helminthoglypta stageri
1056- Helminthoglypta cuyamacensis piutensis
1058- Pseudochama clarionensis
1059- Lamellaria sharoni
1060- Micrarionta orocopia
1061- Alabina effiae
1062- Micrarionta chacei
1063- Ischnochiton catalinae
1065- Glycymeris keenae
1066- Nuculana burchi
1067- Cardita hilli
1073- Volvulella tenuissima
1074- Philine californica
1075- Melanella rosa
1082- Acteocina anomala

Additions and Corrections

The following paper was received from Mr. Allyn G. Smith after the typing of pages 21-24. Comparison of Mr. Smith's diagnosis with the other is interesting.

Family Ovulidae vs. Amphiperatidae. In the Monterey paper we used the former but on further study I think the latter is to be preferred, following Schilder, who, like Grant and Gale, says that " families and subfamilies should be named after the oldest name given to a genus which undoubtedly belongs to the family or subfamily". The genus in this case is apparently Amphiperas, which is not represented on the West Coast. Schilder divides the family into two " Tribes", which seems all right but a rather unnecessary complication. Otherwise, like Strong, I would recommend following Schilder rather than Dall for this group. This leaves a consideration only of the genus Neosimnia Fischer, 1884 for the West Coast species, with one exception- this being Cyphoma emarginata Sowerby, 1830 from Mazatlan and south, which is out of our range.

Neosimnia loebbeckeana (Weinkauff)- Don't know this species and don't have the description, which, I surmise may be in Chemnitz Conch. Cab. The Academy does not have a copy of Chemnitz and the only one on the coast is at UCLA I am told. (* Note- also at U.S.C.- Editor *) If so, U.S. Grant would be the one to supply the description if it is in Chemnitz. Schilder (1932) refers to another paper by him in the Zool. Anzeiger in 1931 in which he comments on loebbeckeana and gives an outline figure of the type. As this is in German and I have no German dictionary handy, I am enclosing a copy of these comments along with a tracing of the figure he gives. This figure is strikingly like the shell I would identify as vidleri from Monterey and seems to be hardly as slender as barbarensis. I am skeptical of Schilder's placement of barbarensis and catalinensis as subspecies. Until it is decided that loebbeckeana and barbarensis are the same or closely related, I prefer to consider the latter and catalinensis as separate species.

Neosimnia barbarensis (Dall)- Whether this is " the pellucid, pale, deep-water variety of loebbeckeana ", as Schilder thinks, depends on what the latter is and where it is normally found. As indicated above, I would rate barbarensis as a good species until better evidence is at hand. Although reported from Monterey by Keep and Berry, I am now inclined to suspect that these records are questionable and may refer to vidleri. Berry (1907) obtained a single specimen " over an inch long", which was identified as barbarensis but the size is nearer to vidleri. Barbarensis, as I understand this species, does not get much over half an inch long.

Collecting data: San Pedro Bay (Tremper), 2; Off Newport, from fishermen (Mrs. Baldridge) 2.

Neosimnia catalinensis Berry- - I don't agree with Schilder, that this is " evidently a young shell of barbarensis" Would call it a good species. The white color and thin lip appear to set it off from other species, and there are other differences.

Collecting data: Monterey (Dall), a record that needs confirming. Have seen no authentic specimens from the Bay. San Pedro Bay (Tremper), 1; off La Jolla, dredged by Univ. of Calif. 1
Both shells, above, which I identify as this species are much smaller than the type, but appear to be adult.

(con.)

Neosimnia vidleri (Sowerby)- Schilder (1932) says in a footnote to this species: " Future investigation will probably prove its identity with avena ." I doubt this/ Avena is a small transversely-striated species from the Mexican fauna, whereas vidleri is a large one with striae only showing at the extremities. The Academy has two lots: Monterey Bay, from fishermen (Hemphill), 2; Monterey Bay (Stearns Collection),1. These three shells agree in color markings although Hemphill's are larger, measuring 20.0 and 22.9 mm. in length. Color of the body whorl a rather light, washed-out pink with an indistinct band of white transversely across the middle and widening out somewhat at the outer lip and columella. The edges of this whitish band are indistinct and merge gradually into the pinkish color of the rest of the whorl. Lip and extremities are creamy-white, the latter having a suggestion of orange-yellow. If these shells have not faded with the years (as they may have), I suspect they represent a light-colored phase of vidleri. The one you collected, and those Vidler got originally could be a dark-colored phase. Does your shell show the indistinct whitish band encircling the body whorl ?

Neosimnia inflexa (Sowerby)- Schilder puts " variabilis Reeve 1865" in synonymy, but this is an error for variabilis C.B. Adams 1852 (Panama Shells) Tryon, in the Manual, calls variabilis C.B. Adams a " variety" of O. uniplicata, an Eastern U.S. and West Indian species, and then follows the inadmissible procedure of placing several older species in the synonymy of variabilis, including inflexa Sowerby,1832, rufa Sowerby,1832, loebbeckeana Weink. 1881, livida Reeve 1865, californica Reeve 1865, and aequalis Sowerby Sowerby 1832. This is such a conglomerate mixture that it doesn't make sense with what we know now, so I think we can disregard Tryon entirely. The original description of inflexa is as follows: * This is already copied and on p. 23)*

The description of variabilis is in Oldroyd, but as Adams' remarks are of considerable additional interest I am enclosing a pencilled copy of them. Note that he says his species " resembles inflexa" and says that on comparison the two may prove to be identical. Note also that both the light and the purple color-phases were collected on the same species of cream-colored gorgonian, which throws doubt on Tryon's statement that shells of this group take on the color of the gorgonian on which the animal feeds. * See end of this paper for these notes from Adams etc. *
I think we can safely put variabilis into the synonymy of inflexa, and call our California shells with the carinate columella and the purple color this species. The only other species with a columellar shelf if N. aequalis Sby.

Collecting data: Monterey Bay, a young living specimen dredged in 12 fms. (Berry); Monterey, from fishermen or on the beach, 8 (AGS collection although collected by others); Monterey, from a cod stomach (Gordon) 2; Gulf of Calif., Hemphill, 10 (CAS); Gulf of Calif., Hemphill 2 (CAS).

Neosimnia aequalis (Sowerby)- As Schilder says this species is found in California we will have to consider it. He puts californica Reeve 1865 in synonymy, and reports the range as California, Lower California, Mazatlan, Mexico, Galapagos Islands, and probably also Ecuador. The description of californica follows, from Reeve:

" Shell elongately oblong, livid purple, or lead color, back smooth, lip moderately thickened, flexuous, extremities somewhat acuminately produced, aperture wide open, columella slightly excavated, obtusely callously plaited at the upper part." ..." Sowerby, MS, in Mus. Cuming." ... " Hab. California .. of a peculiar livid, leaden-purple color; the callous enamel of the lip and columella being of an orange blood-red." (con.)

Collecting data: San Lucas Bay, L.C. 1 (CAS); Mazatlan, coll. by Hertlein, 2 (CAS).

These specimens are not very different from those of the preceding species (inflexa) and appear to be well within its range of variation. Schilder's ~~figure~~ figure emphasizes a longitudinal plication or callous plait at the upper part of the shell, which seems to be the major difference between aequalis and inflexa. On the strength of the small amount of evidence I have, there would seem to be some justification for throwing aequalis into the synonymy of inflexa, but you may find other evidence to let it stand as a good species.

Neosimnia avena (Sowerby)- This is a Lower Californian and Mexican red-purple species, characterized by having the body whorl crossed by numerous fine rather wavy striations. It is distinct and there is no other close to it. Sowerby's description follows:
" Ovulum avena Sowerby, P.Z.S.,1832, p. 173. " Ov. testa oblonga, rufa, extremitatibus subacuminatis; dorso subgibboso, transversim tenuissime striato; labio externo incrassato, pallidiore; apertura angusta, antice latiore, postice emarginata; columella postice uniplicata: long. 0.55, lat. 0.22 poll." ... " Hab. in America Centrali (Conchagua)".
Tryon puts vidleri in synonymy, which is definitely wrong. He also states the range as " Panama to Monterey", but I have seen no specimens from Monterey and very much doubt its occurance in California, in spite of the fact that Adams (Panama Shells) says " Santa Barbara- E. Jewett/ Gould MSS." Adams says he found 6 specimens " on the reef at Panama". He says also that " Conchagua" is another name for the Gulf of Fonseca.

Collecting data: Mazatlan, on the beach, coll. by Hertlein, 3 (CAS).

Neosimnia rufa(Sowerby)- Livida Reeve in synonymy, according to Schilder, whose measurements show that rufa is the smallest of the West Coast species averaging 5-7 mm. in length. The Academy has a lot of 2 specimens collected by the Albatross in Lower California at San Lucas Bay. Schilder cites the range the same as for aequalis , which includes California. Would omit it from our list unless authentic records from California are reported. It is a tiny, brilliant species. You would know it if you have one.

Neosimnia quaylei Lowe- Not on our list, but mention it because I suspect it may be found elsewhere than Punta Penasco with more collecting.

I am enclosing also some pencilled outline tracings of several species illustrated by Schilder and Reeve's figure of californica, as you may find them helpful.

C.B. Adams- Panama Shells 1852- pages 31-32- 4. Ovula variabilis- Nov. sp.
" Shell very slender usually white, with a slight tinge of rufous, with the lip opaque white; sometimes of a rich red purple; smooth; aperture not very narrow, a little widened anteriorly, moderately produced effuse, and slightly inflected posteriorly; obliquely emarginate anteriorly; lip well thickened; columella with a longitudinal keel, acute and obliquely produced anteriorly, posteriorly somewhat biplicate. Length .54 inch; breadth . 15 inches.

" This shell resembles O. inflexa Sowerby, but is more slender. Perhaps on comparison specimens, they may prove to be identical. O. uniplicata Sowerby is larger, with a wider aperture.

" Station- At the low water mark of the spring tides. The light colored specimens were found on a cream-colored species of Gorgonia, and the purple specimens on Gorgonia of the same color. Of 56 specimens, four are purple, and 14 are mature, and 42 immature. (con.)

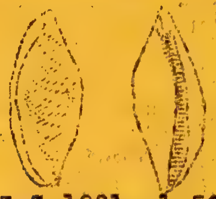
" Habitat.- San Juan, Lower Calif.- Lt, Green/ Gould MSS. Purple shells. Santa Barbara- E. Jewett/ Gould MSS. Pale or moderately tinged with purple. Panama- CBA.
The 56 specimens were all taken on the reef at Panama. Mr. Cuming found one specimen of O. inflexum in the Gulf of Dulco."

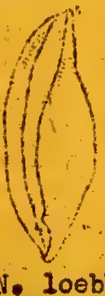
5. Ovula sp. Indet.

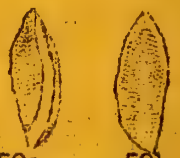
" We abstein from describing this species, because the only two specimens which we have are immature. They resemble O. variabilis but the general form and the aperture are wider, and the shells are covered with excessively minute revolving striae. Except in being striated, they resemble O. inflecum Sowerby. They were found on the reef."

The original description of this species follows. The data given on p.23 we note was Weinkauff's.
Ovulum inflexum Sowerby- P.Z.S., 1832, p. 173.
" Ov. testa oblonga subcylindrica, laevi, pallida, postice subrostrata, inflexa; apertura antice subeffusa; labio externo incrassato, collumellari intus carinato; columella postice uniplicata: Long. 0.70, lat. 0.25 poll."
" Hab. in America Centrali. (Gulf of Dulco)."

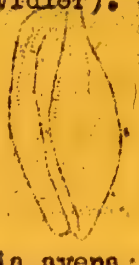
Schilder, F.A. Zool. Anz. Vol. 96, No. 3,4, pp. 65-72, figures 1-7, Sept. 15,1931.
I. Wissenshaffliche Mitteilungen- Beitrage zur Kenntnis der Cypraeacea (Moll. Gastr.) - IV.
12. Weinkauffs Typon im Loebbecke -Museum.
p.67-" Ovula loebbeckeana: Da wie von weinkauff gegebene Zeichnung (Taf. 50, Fig. 6-7) in allen Teilen vollkammen missroten ist,sei hier einegenouere Abbildung des Originals wieder gegeben (Abb. 1). Der typus misst 23.4:34/26. R. ohne Querkiel, E. fein gestreift, etusas linksgegoben, Al.schmal,vorn kaum ausgebogen (/). Funiculum schrag, massig stark,die IL. nur wenig uber die Halfte uberguerend (/), hintere IL.- Spitze deutlich obgesetzt ausgesgen, Fossula auf einen ganz leichten, kurtzen Langseindruck reduziert; R. lilarosa (Weinkauffs Beschvetbung: "albo";Abbildung: lila). Die Artmerkmale stimmen vollkommen mit der allerdings noch dunnschaligeren,blassgelben Neosimnia barbarensis (Dall,1892) aus Kalifornien uberein; diese ist also als Unterart (Tiefwasser form) mit loebbeckoana zu verinigen."

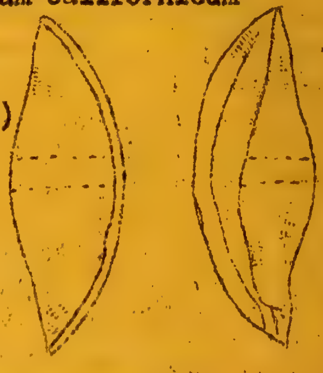

Sowerby P.Z.S.1881,pl.56
Fig. 1 Ovulum vidleri, n. sp.
" Hab. Monterey, west coast of America (Mr. Vidler).


N. loebbeckoana barbarensis
(17 mm. California)
Schilder,1932
pl.5, fig.53



Reeve,1865,15
Ovulum californicum


Neosimnia avena
(13 mm. Mazatlan)
Schilder,1932, pl.4, fig.50


Neosimnia loebbeckeana Weink.
(Typus)

Several of the members contributed to the discussion brought up again in Minutes # 52 p 34 by A.W.B. Powell.

Dr. A. Myra Keen writes " As to Mr. Powell's comment on page 34 of last month's Minutes: Opinion 124 covers the case of Bulla: " The various subdivisions of genera published by Linnaeus in 1758 are not to be accepted as of this date (1758) as of subgeneric value under the International Rules". This decision was rendered as a general opinion and as a specific answer to the problem of Linnaeus' double usage of the name Bulla.

Mr. Henry Dodge, 6 Rochambeau Road, Scarsdale, N.Y. writes in as follows: " My congratulations to you upon the continued excellence of the Check List of California mollusks, and the interesting comments thereon, in the Minutes. I have been particularly interested in the Bulla dispute. New views keep coming in all the time on this question and I should think that a lot of it could be simplified if you would broadcast the fact that the International Commission has laid to rest the complication brought about by the famous " cricket" argument (Subgenus Bulla, under Gryllus, Insecta, Coleoptera, pg. 427, Syst. Nat. Ed. 10.)

A.W.B. Powell has raised this ghost again in the September Minutes. A reading of Opinion 124 of the Commission, and their added comments should clear the air on this point at least. ... I am adding the Opinion and the comments on the attached sheet.

Opinion 124 of the International Commission- Issued October 28th,1936.
124. Linnaeus,1758, Subdivisions of Genera.- The various subdivisions of genera published by Linnaeus in 1758 are not to be accepted as of this date (1758) as of subgeneric value under the International Rules.

The Commission adds:

" The adoption of this automatically settles the case of Bulla now before the Commission, i.e. the alleged subgenus Bulla Lin. 1758 , Insect, is not a subgenus under this opinion and therefore does not affect in any way the standing of Bulla Lin. 1758 (a), Mollusk.

" Even in the ansence of this opinion, the case of Bulla would be settled under the following amendment to Article 30 (on Homonyms) adopted at Padua 1930: (Note: This is apparently a misprint for Art.36).

" When homonyms are of the same date, whether by the same or different authors, then any name proposed for a genus takes precedence over a name (its homonym) proposed for a subgenus. The same principle applies to homonyms of species and subspecies of identical date."

(This latter amendment was mentioned by C.W. Johnson in the Introduction to his " List of Marine Mollusca of the Atlantic Coast...." 1934, and specifically applied by him to the Bulla question. Grant and Gale, on the other hand, reject Bulla, Mollusk, as a homonym (see their discussion of Scaphander, pg. 451, and Bullus, pg. 455-6) although the amendment was published a year before Grant and Gale catalogue appeared.),"

Our conclusion and discussion of the above matter was contained in Minutes #47 , pp. 20,21. We decided that the name Bulla should apply to the group formerly known as Atys. In Minutes #48 pp 2-3 we place the species formerly placed under Bulla under Vesica. Otherwise we have followed other recent authors in accepting Bulla according to the above data. Editor.

Additions and Corrections

The following additional comments and data on the Neosimnia discussion received from Mr. Allyn G. Smith. " Hertlein has just sent me the descriptions from Sowerby of the Lower and Central American species, and, as I did not include all of them in my last letter, I will enclose them. This shows that N. inflexa has page perference and the name would stand in the event that aequalis is finally decided to be the same.

P.Z.S. 1832 p. 173

Ovulum rufum- testa oblonga, postice acuminata, rufa; labio externo incrassato, pallidiore; apertura angusta, antice latiore; columella intus linea longitudinali depressa, plicaque subspirali; long. 0.50, lat. 0.15 poll. Hab. ad Columbiam Occidentalem.

Ovulum avena- See page 39 this issue Min. for Orig. description.

Ovulum inflexum- See page 40 "

p. 174 P.Z.S. 1832

Ovulum aequale- Testa oblonga, subcylindrica, rufa; labio externo incrassato; extremitatibus obtusiusculis; apertura latiuscula, utraque extremitate aequali; columella carina interna distincta; long. 0.45, lat. 0.18 poll. Hab. as panaman.

Add the following collecting data:

Pedicularia californica Newcomb,1864- 53:25- Monterey Bay, 20-50 fathoms, on pink coral, generally brought in by fishermen. Monterey Bay, " one beautiful specimen is over half an inch in diameter" (Berry,1907),

Zonaria spadicea (Swainson),1823- 53:25-" Cypraea spadicea Swainson- Living at low tide, a single specimen, Monterey Bay (Mrs. Fackenthall). I have seen this specimen and consider the record to be authentic. See Ingram, Nautilus, 52(1): 1-4 and plate. Hertlein and I would prefer to retain Cypraea, Ingram should be consulted on the taxonomy of the group as he has made a recent study of it." Mr. W.K. Emerson also contributes a note on this species " Common at the end of Point Loma. They were found for the first time in several years in Mission Bay last year. Iam afraid the collectors have almost cleaned the colony out."

Pusula solandri (Sowerby),1832. 53:27- San Clemente, Vail (AGS); 5 mi. S. of Laguna Beach (AGS); Magdalena Bay, Orcutt (AGS).
W.K. Emerson reports " Beach specimens at Coronado,Calif.; common at Loreto, Baja Calif." R.L. Morrisson " La Jolla, Torrey Pines". All reported as Trivia.

Pusula radians (Lamarck) and Pusula sanguinea (Sowerby)- 53:27- . Mr. Smith advises " CAS specimens are all from the Gulf. Have seen none from California."

Pusula [illegible] Raymond - 53:27 - Monterey (Dall); 33 fms. off Isthmus, Catalina, T. Crocker,1938, 1 small specimen (Gordon).

Pusula californiana (Gray)- Monterey Bay, below low tide to 40 fms. Living at low tide on rocks at Mission Bay (AGS); Pleistocene at Cayucos (AGS). W.K. Emerson " Beach specimens at Coronado". R.L. Morrison " Mission Beach".

Erato vitellina Hinds- 53:30- Monterey Bay, shore to 35 fms. (A.G. Smith) Rare alive in Mission Bay (W.K. Emerson);

Erato columbella Menke- 53:31- Monterey Bay, shore to 20 fms. (A.G. Smith). Common in sand at La Jolla (W.K. Emerson). Mission Beach, Mission Bay, La Jolla, Pacific Beach (R.L. Morrisson).

MINUTES OF THE CONCHOLOGICAL CLUB OF SOUTHERN CALIFORNIA
November 1945

These papers are published by a group of interested students for our own pleasure and financed by voluntary contributions of members and friends. It is not our intention to offer subscriptions and guarantee regular periodical publication. However, non-members of our club will be placed on our mailing list and receive all papers published for contributions to our fund of $2.50 per year or $1.25 each six months.

Our next meeting will be held Dec. 4,1945, at the Los Angeles Museum, Exposition Park, Los Angeles, Calif. at 7:30 P.M. All interested persons are welcome.
We are again meeting on the first tuesday of each month at 7.30 P.M.

Please maill all news about shells, shell publications, shell collectors shell trips, localities etc. to your editor,

John Q. Burch,
4206 Halldale Ave.,
Los Angeles 37, Calif.
Phone Ax 2-7965

****

The following families are not represented in the California fauna, but the key and list of species from the southern fauna are copied from Mr. A.M. Strong's notebook.

Family Architectonicidae

Genus Haliacus

Spire with a subsutral periphery with 2 spiral cords, base grooved
Diameter 4.3 mm. Mazatlan .... planispira
Spire with 3, periphery with 2, base with 5 spiral cords
Diameter 4.5 mm. Acapulco .... chiquita
Spire with 4 or more spiral cords
. Base smooth, umbilical margin crenulated
Diameter 6 mm. Chile .... kochii
. Periphery with two cords, base with 5 granular grooves
Diameter 5.8 mm. Mazatlan .... mazatlanicus
. Periphery and base with 6 spiral cords
Diameter 15 mm. Magdalena Bay to Panama .... radiatus
. Periphery and base with 8 spiral cords
Diameter 3.8 mm. Panama .... panamensis

Haliacus radiatus Menke	Magdalena Bay to Panama
Haliacus mazatlanicus Pilsbry and Lowe, 1932	Mazatlan
Haliacus planispira Pilsbry and Lowe, 1932	Mazatlan
Haliacus chiquita Pilsbry and Lowe,1932	Acapulco
Haliacus panamensis Bartsch,1918	Panama
Haliacus kochii Dall,1909	Chile

Genus Architectonica Roeding,1798

Architectonica granulata (Lamarck),1822	Lower Calif. to Peru (nobilis Hinds
Architectonica granosa Val. (,)	Acapulco
Architectonica (Philippia) radialis Dall,1908	Panama

Family Modulidae

Genus Modulus

Columella grooved, ending in a sharp tooth .... Modulus
• Axial sculpture absent, periphery sharply keeled
•• Spire and base with subgranular spiral cords
Diam. 18 mm. Magdalena Bay to Peru .... catenulatus
• With distant radial ribs forming nodules at the periphery
•• Spire depressed, base with 1 or 2 major spiral cords
Diam. 12 mm. Lower Calif. to Panama .... cerodes
•• Spire conical, base with close spiral cords
Diameter 10 mm. Magdalena Bay to Panama .... disculus

Modulus catenulatus (Philippi),1847	Magdalena Bay to Peru. Atlantic
Modulus cerodes A. Adams,1852	Lower Calif. to Panama
Modulus disculus (Philippi),1947	Magdalena Bay to Panama
Modulus perlatus Dillwyn,1817	Ecuador to Peru
Modulus duplicatus (A. Adams),1850	Galapagos

Genus Haploconchlias

Haploconchlias cyclophoreus Carpenter	Gulf of California

Family Planaxidae

Genus Planaxis

Planaxis nigritella Forbes,1850	Lower Calif. to Panama
Planaxis planicostatus Sowerby,1825	Gulf of Calif. to Peru

Family BURSIDAE

Grant and Gale state " The Bursidae", formerly called the Ranellidae, differ from the Muricidae in radular characters and in the less often closed anterior canal, and from the Cymatiidae in having a well developed posterior canal."

Genus Bursa Roeding,1798. Type (by subsequent designation, Jousseaume, 1881), Bursa monitata Roeding = Murex bufonius Gmelin.

" Shell ovate, rather compact, with two continuous opposite varices or protruding nodosities; aperture ovate, with a well-marked posterior canal and an open, curved anterior canal; columella arcuated or ridged."

Bursa californica Hinds,1843. Monterey, Calif. to Cerros Island, L.C. and Guaymas,Mex. (Lowe). Type locality, San Diego, Cal if.

Collecting data: Dredged off Monterey in 10 to 20 fathoms on the shale-was comparatively rare netting but five living specimens ; very abundant off Redondo Beach and Catalina Island in 15 to 50 fms. most common around 25 fms. washed in after storms all along the southern California coast; it is obviously a scavenger and gets into crab and lobster traps in great numbers. It is very abundant along the coast of Lower Calif. below Ensenada. Some eat them and they are sold for food on the Redondo Beach pier.(Burch); Cayucos living and fossil (Caruthers); Guaymas,Mex. (Lowe); Santo Domindo,L.C. (Orcutt); San Bartolome Bay,L.C. (Harrison); San Diego (Baker and Orcutt); Mission Bay (Wilson); Del Mar (Bristol); Catalina Island in 30 fms.(Lowe).

The following key and list of species from the southern fauna will be of interest. It is from Mr. A.M. Strong's notebook.

A single row of strong nodules on the shoulder
- Surface above and below the shoulder smooth
  Height 40 mm. Lower Calif. to Panama .... nana
  Reeve, Ranella, pl.68, fig. 29; Tryon,vol.3, p.38.
- Surface smooth between spiral lines of granules
  Gulf of Calif. to .... albifasciata
  Reeve pl.6, fig.27
- Surface spirally striated, slightly granular
  Height 125 mm Monterey to Cerros Island .... californica
  Reeve pl.2, fig.9; Oldroyd 2-2-241.

Two unequal spiral series of nodules, fine beaded threads
Height 45 mm Lower Calif. to Panama .... calcipicta
Bull. Mus. Comp. Zool. 43-320.

Several spiral series of double nodules, surface striated columella with white granular wrinkles
Height 40 mm Gulf of Calif. to Peru .... caelata
Reeve pl.3, fig.10; Tryon vol.3,p.41

Surface obscurely rugose or smooth
Height 75 mm. Peru .... ventricosa
Reeve pl.2,fig.6; Tryon vol.3, p.40.

Bursa californica Hinds,1843. Monterey to Guaymas
Bursa nana (Broderip and Sowerby),1829. Lower Calif. to Panama
Bursa albifasciata (Sowerby),1841. Gulf of Calif. to
Bursa caelata (Broderip),1832 Gulf of Calif. to Peru
Bursa calcipicta Dall,1908. Lower Calif. to Panama
Bursa (Crossata) ventricosa (Broderip),1832. Nicaragua to Chile

The following genera are not represented north of San Diego, but the data from Mr. A.M. Strong's notebook will be of value.

Family Strombidae

Genus Strombus Linnaeus,1758.

Strombus gracilior Sowerby,1825.	Lower Calif. to Ecuador
Strombus granulatus Swainson,1823.	Gulf of Calif. to Peru
Strombus galeatus Swainson,1823.	Gulf of Calif. to Panama
Strombus peruvianus Swainson,1823	Tres Marias Islands to Peru

Shoulder of whorls tuberculate
• Body whorl smooth
Length 3 inches Lower Calif. to Ecuador .... gracilior
• Body whorl with spiral rows of nodes
•• Spire turrited, strongly tuberculate
Length 3.5 inches. Gulf of Calif. to Peru .... granulatus
•• Spire depressed, spirally ribbed
5 to 7 inches. Tres Marias Islands to Peru .... peruvianus
Shoulder of whorls not tuberculate
Length 8.5 inches. Gulf of Calif. to Panama .... galeatus

Shell subtriangular to cylindrical
• Body callus conspicuous .... Cassis
•• Callus margin adherent ....(Cypraecassis)
••• With 4 spiral rows of tubercles and paired spiral grooves
Height 125 mm. Gulf of Calif. to Galapagos .... tenuis
Reeve- Cassis, fig.13; Tryon vol.7,p.272
•• Callus margin free near the canal ....(Levenia)
••• With 3 to 4 spiral rows of tubercles and granular spiral ridges
Height 85 mm. Gulf of Calif. to Panama .... coarctata
Reeve, Cassis, fig.14; Tryon, vol.7, p. 272.
• Body callus inconspicuous .... Morum
•• With 5 spiral rows of tubercles and fine spiral ridges
Height 35 mm, Gulf of Calif. to Panama .... tuberculosa
Reeve, Oniscia fig.5; Tryon,vol.7, p.281.
Shell globose or globosely ovate
• Columella plaited or granular .... Phalium
•• Lip thickened, slightly effuse toward the base
Height 125 mm., Gulf of Calif. to Ecuador .... abbreviata
Reeve, Cassis, fig.18; Tryon, vol.7,p.274.
•• Lip with 4 spines toward the base
Gulf of Calif., South Seas .... vibex
Stearns, Proc. U .S.N.M. vol. 17, p. 188
• Columella simple ....Oocorys
•• With close spiral cords and fine axial threads
••• Axial threads overrunning the spirals
Height 30 mm. Panama, 1201 fms. .... pacifica
Bull. Mus. Comp. Zool. v.43, p. 323, pl.4,fig.7
••• Axial threads in interspaces only
Height 45 mm. Panama, 1672 fms. .... rotunda
Bull. Mus. Comp. Zool. vol.43, p.322, pl.4, fig.9
•• With flat spiral bands and fine axial lines
Height 60 mm. Galapagos, 2235 fms. .... elevata
Bull. Mus. Comp. Zool. vol.43,p. 322, pl.8, fig.9

Genus Cassidea	
Cassidea abbreviata (Lamarck),1822.	Gulf of Calif. to Ecuador
Cassidea vibex mexicana Stearns	Lower Calif.
Genus Cypraecassis	
Cypraecassis tenuis Gray (Wood),1828	Gulf of Calif. to Galapagos
Cypraecassis coarctata (Sowerby),1825	Gulf of Calif. to Panama
Genus Morum	
Morum (Plesionisca) tuberculosum (Sowerby)	Lower Calif. to Panama
Genus Oocorys Fischer,1884	
Oocorys rotunda Dall,1908.	Panama
Oocorys pacifica Dall,1896	Panama
Oocorys elevata Dall,1908.	Galapagos

Family Ficidae

Genus Ficus Roeding,1798	
Ficus ventricosus (Sowerby),1825.	Gulf of Calif. to Panama

Family Tonnidae

Genus Malea Valenciennes,1832	
Malea ringens (Swainson),1822.	Gulf of Calif. to Peru

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Family Cymatiidae

Genus Fusitriton Cossmann,1903. Type (by original designation), Triton cancellatus Lamarck.

" Shell thin, cancellated, no body callus, varices few and feeble, epidermis shaggy and usually persistent."

The above data from Dr. A. Myra Keen (Per. Comm. Sept.,1945).

The most important reference on this matter is Woodring, W.P., Geological Survey Professional Paper 190,pp. 23-24,1938. Dr. Woodring advises " Triton" oregonense is closely related to " Triton" cancellatum Lamarck (Cape Horn and vicinity), the type of Fusitriton, and I think Fusitriton should be given generic rank. Argobuccinum and Priene are quite different."

Dr. A. Myra Keen advises further (Per. Comm. Sept. 1945) as follows: " Genus Argobuccinum Herrmannsenn,1846 (ex Klein). Type (orig. desig., Murex argus Linne. This is a heavy, dull-colored shell with inconspicuous varices and a short canal. It is not the Argobuccinum of subsequent authors, for which Fusitriton is available. Priene Adams,1858 resembles Fusitriton but also like Argobuccinum has a short canal; the operculum has an apical nuclear and there is a slight more or less lirate body callus".

West coast authors have been disposed to use a variety of names for this species. A synonymy would amount to a list of all recent authors. We propose to accept the above classification.

Fusitriton oregonensis (Redfield),1848. From the line of floating ice in winter in the Bering Sea near the Pribilof Islands, south on the west to the Okhotsk Sea and Japan, and on the east to San Nicolas Island, Calif.; San Diego in deeper water. (Raymond).

" The type locality of Fusitriton oregonense is Straits of Juan de Fuca" (advice of Dr. A.M. Keen).

Collecting data: San Diego, deep wwater from fishermens net; Puget Sound (Lowe); Drier Bay, Alaska (Eyerdam); Wakasa,Japan (Hirano) (San Diego Museum); Puget Sound and Straits of Juan de Fuca (T. Kincaid).

Genus Cymatium Roeding,1798. Type (by subsequent designation,Dall, 1904), Murex femoralis Linnaeus,1758 - Cymatium femorale Roeding.

" Whorls triangular; aperture longer thanthe spire; outer lip dentated internally. Operculum with apical nucleus." (Tryon)

Cymatium corrugatum tremperi Dall,1907. San Pedro to Gulf of California.
Type locality, off San Pedro, Calif.

We have the following note from Dr. A. Myra Keen regarding this species and we propose to run the photograph on our next plate. Dr. Keen says " I enclose a photograph of the holotype of tremperi, as I believe it has never been illustrated. Without information as to arrangement of varices, I cannot assign this form subgenerically."

Subgenus Turritriton Dall,1904. Type (by originaldesignation), C. gibbosum (Broderip).

Cymatium gibbosum (Broderip),1833. San Pedro and San Diego,Calif. to Panama.
Type locality, Panama.

Collecting data: Tres Marias Islands; Tiburon Island; Mazatlan;La Paz; Panama; Salvador; Costa Rica: (H.N. Lowe); Scammon's Lagoon (Porter) (San Diego Museum of Natural History).

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The following keysand list of species from Mr. A.M. Strong's notebook will be of interest.

Family Cymatiidae
Shell pyriform, with a pointed spire and moderate to long canal
. Whorls regular.. Cymatium
.. Whorls distinctly triangular
... Sculptured with 3 smooth spiral cords only - no dentition
Height 150 mm. Magdalena Bay to Panama .... tigrinus
Reeve pl.8, fig. 27; Tryon vol.3,p.18,pl.10,figs.71,72
... Axial ribs faintly noduled or warty - 4 varicose denticles-
Height 60 mm. San Pedro to Peru .... gibbosus
Reeve pl.13nfig.38; Tryon, vol.3,p.23,pl.12, fig.101.
.. Whorls not distinctly triangular
... Spiral ribs tuberculate over entire surface
Height 85 mm. San Pedro to Gulf of Calif. .... tremperi
Reeve pl.3,fig.13
... Spiral ribs tuberculate on the shoulder only
.... Tubercles large
..... Spiral cords equal, flat,strap like
Height 33 mm. Gulf of Calif. .... adairense
Nautilus 24,p.33; Proc. USNM vol.66, pl.35, fig.1.
..... Spiral cords alternating in size
Height 35 mm. Galapagos .... lineatus
Reeve pl.2,fig.4; Tryon, vol.3, p. 14, pl.8,fig.51.
.... Tubercles small, more or less obsolete
..... Spiral ridges very strong, sometimes double
Height 100 mm. Magdalena Bay to Peru .... costatum
Reeve pl. 10, fig.32; Tryon, vol.3, p. 11
..... Spiral ridges regular, flat,equidistant
Height 65 mm. West coast ? .... cingulatum
Reeve, pl.11, fig.35; Tryon vol.3,p.15
..... Spiral ridges faint, irregular
Height 75 mm. Gulf of Calif. to Peru .... weigmanni
Reeve pl.11, fig.37; Tryon, vol.3, fig.15, pl.9, fig.57.

... Spiral ridges crenulated, not tuberculate

.... Columella and lip blood red, wrinkles white
Height 100 mm. Gulf of Calif. to Peru .... pilearis
Reeve pl. 7,fig.23; Tryon vol. 3, p. 12, pl.6, figs. 31-34.

.... Columella and lip blackish purple, wrinkles white
Height 100 mm. Cerros Island to Peru .... vestitus
Reeve pl. 20, fig.101; Tryon vol.3, fig.12.

.... Columella yellowish, a double row of white teeth
Height 30 mm. Gulf of Calif. to Ecuador .... lignarium
Reeve pl. 13, fig.40; Tryon vol.3,p.15, pl.9,fig.63.

. Whorls distorted .... Distorsio

.. Columella with large, irregular granules
Height 50 mm. Lower Calif. to Panama .... decussata
Reeve pl.12, fig.41; Tryon vol.3,pl.17,fig.176.

.. Columella with strong wrinkles
Height 50 mm. Panama .... ridens
Reeve pl.12 fig.46; Tryon vol.3, pl.17, fig.177

Shell ovate, spire and canal short

. Columella wrinkled or dentate .... Argobuccinum

.. Sculpture nodulous

... Shell brown, banded, rubbed nodules white
Height 100 mm. Chile .... ranelliform
Tryon vol. 3,p.45, pl.24,fig.62; Reeve, Ranella,pl.3,fig.13.

... Shell yellowish brown, columella nearly smooth
Height 50 mm. Chile .... rude
Reeve, Triton,pl.14,fig.53; Tryon, vol.3,p.34,pl.16,fig.169.

.. Sculpture sharply cancellated
Height 60 mm. Ecuador to Chile .... scaber
Reeve, Triton, pl.11, fig. 34; Tryon, vol.3,p.34,pl.16,fig.168.

Genus Cymatium Roeding,1798.

Cymatium (Cabestana) gibbosum (Broderip),1833.	San Pedro to Peru
Cymatium corrugatum tremperi Dall,1907.	San Pedro to Gulf of Calif.
Cymatium vestitus (Hinds),1844.	Cerros Island to Peru
Cymatium costatum (Born),1778.	Cosmopolitan. Magdalena Bay to Peru
Cymatium tigrinum (Broderip),1833.	Magdalena Bay to Panama
Cymatium adairense Dall,1910.	Gulf of California
Cymatium pilearis (Linnaeus),1758.	Cosmopolitan. Gulf of Calif. to Panama
Cymatium weigmanni Anton,1839.	Gulf of Calif. to Peru
Cymatium lignarium (Broderip),1833	Gulf of Calif. to Ecuador
Cymatium amictus (Reeve)	Philippines, West Mexico
Cymatium lineatus (Broderip),1833	Galapagos
Cymatium cingulatum (Lamarck)	Indo-Pacific, Peru
Cymatium anomalum (Hinds),1844	Nicaragua
Cymatium olearum (Deshayes)	West Indies, Gulf of Calif.

Genus Distorsio Roeding,1798.

Distorsio decussata (Valenciennes),1833.	Lower Calif. to Peru
Distorsio constricta (Broderip),1833	Central America to Panama

Genus Argobuccinum Klein,1846

Argobuccinum scabrum (King),1831.	Ecuador to Chile
Argobuccinum rude (Broderip),1833	Chile
Argobuccinum ranelliformis (King),1831.	Chile

Genus Tritonharpa Dall,1908.

Tritonharpa vexillata Dall,1908.	Galapagos

Genus Craspedotriton

Craspedotriton scalariformis (Broderip),1833.	Gulf of Calif. to Panama

Family Seguenziidae

Genus Seguenzia Jeffreys,1876. Type (by subsequent designation,Harris, 1897), Seguenzia formosa Jeffreys. Fide Woodring,p.327,1928.

" Shell small,trochoid,somewhat nacreous. Nucleus strongly inflated, rising abruptly from apex of shell, consisting of a bout one whorl. Aperture ovate. Outer lip bearing at suture a deep, narrow and sinus, and also a shallow sinus at periphery and base. Basal lip everted below columella,producing a suggestion of a canal. Columella ending in a tooth-like projection. Inner lip reflected over a narrow umbilical opening in type species. Sculpture consisting of sharp spiral ridges and very fine spiral threads, and of axial threads curved in conformity to shape of outer lip." (Woodring).

Seguenzia certoma Dall,1919. Off San Diego, Calif. in 600 fathoms.
Seguenzia giovia Dall,1919. Off Catalina Island,Calif. in 118 fathoms.
Seguenzia cervola Dall,1919. Off North Coronado Island in 692 fathoms.
Seguenzia calliana Dall,1919. Off La Jolla and San Diego, Calif. in 243 to 822 fathoms. Type locality, off San Diego in 417 fathoms.

Dr. Joshua L. Baily Jr. commentsas follows: " Some taxonomists have placed the Seguenzidae between the Trochidae and the Neritidae. I don't know, but I think it might be well to mention the fact."

Family Triphoridae

Genus Triphora Blainville,1828. Type (by monotypy), Triphora gemmatum Blainville (= Cerithium tristoma Blainville).

" Shell very small, slender, sinistral. Aperture subcircular. Anterior canal short, curved backward, slightly emarginate, upper part almost or completely closed. Anal notch small, closed in some species and located some distance from aperture. Sculpture consisting of spiral rows of beads joined by axial threads." (Woodring, p. 328, 1928).

The most important reference on this group is Bartsch, Paul, Proc. U.S N.M., no. 1569, vol. 33, pp 249-262, pl. 16 " The West American Mollusks of the Genus Triphoris",1907.

Triphora montereyensis Bartsch,1907. Monterey, Calif.
Collecting data: Dredged off Monterey in 15 fms. (Burch).

Triphora pedroana Bartsch,1907. Redondo Beach, Calif. to San Geronimo Island. Type locality, San Pedro, Calif.

Collecting data: A not uncommon small species in littoral collecting at minus tides along the Palos Verdes from Malaga Cove to Point Firmin, Los Angeles Co. They seem in our experience to have a particular habitat on certain stones covered with a fine worm tube growth. Quite common along the inside of the Balboa, Calif. breakwater. Also dredged off Redondo Beach as deep as 25 fms. in gravel. (Burch); So. Coronado Island in 10 fms. (Baker); San Geronimo Island (Lowe); San Diego (Baker); La Jolla (Bristol); Laguna (Lowe); Pt. Vicente (Strong); Half Moon Bay (Baker). Dr. Joshua L. Baily Jr. reports " In the beach drift at La Jolla there are two distinct forms of Triphora , but Dr. Bartsch has examined all material and calls them all T. pedroana. The radula of Triphora is said to be quite peculiar. I have never examined it."

Triphora callipyrga Bartsch,1907. San Pedro and Catalina Island to San Martin, L.C. (Baker). Type locality, San Pedro, Calif.

Collecting data: San Martin Island, L.C. (Baker); Catalina Island in 35 fms. (Lowe).

Triphora carpenteri Bartsch,1907. Neah Bay, Wash.

Triphora catalinensis Bartsch,1907. Catalina Island and Laguna Beach (Dall) to San Martin Island, L.C. (Baker). Type locality, Catalina Island.
Collecting data: San Martin Island, L.C. (Baker);. La Jolla (Chaney and Bristol).

Triphora stearnsi Bartsch,1907. San Diego, Calif. to the Gulf of Calif. Type locality, Gulf of California.
Collecting data: Gulf of Calif. (Baker). " The type of T. stearnsi is said to be flesh colored. The median cord is faint, even on the last whorl. The figure shows a worn shell with both the tip and aperture broken." (Strong).

Triphora peninsularis Bartsch,1907. San Diego, Calif. to Point Abreojos, L.C. Type locality, Point Abreojos, Lower Calif.
Collecting data: Espiritu Santo Island, Gulf of Calif. (Lowe). " T. peninsularis is uniformly dark brown. The median cord begins to develop on the fifth postnuclear whorl and gradually increases in strength until on the last whorl the three spiral cords are about equal in strength."(Strong).

Mr. A.M. Strong comments upon some of the above mentioned species as follows: " Triphora pedroana is uniformly dark brown. The medial spiral cord begins to develop on the fourth postnuclear whorl and increased in strength until on the last whorl it is stronger than the anterior cord." Triphora callipyrga differs from all other species on the west coast in having three spiral cords on all postnuclear whorls of which the median is the strongest. The shell is uniformly light brown. Triphora catalinensis has the posterior half of the whorls white and the anterior half light brown. The median cord is faint and does not begin to develop until the 7th postnuclear whorl. The type is a young shell and the figure does not show the adult base."

The following key and list of species if from Mr. A.M. Strong's notebook.

Genus Triphora
All postnuclear whorls with 3 tuberculate spiral cords
. Median cord the strongest of the 3
5.2 x 2.2. mm. San Pedro to San Martin Island ...... callipyrga Bartsch
. Median cord not the strongest of the three
.. Tubercles of all cords truncated
2.8 x 1.1 mm (young) Galapagos .... chathamensis Bartsch
.. Tubercles not truncated
3.5 x 1.0 mm. Gulf of California ....cookeana Baker
Upper whorls with 2, later whorls with 3 tuberculate cords
. Median cords on last whorl the strongest
.. Pits between axial ribs and spiral cords ill defined
3.2 x 1.1 mm. (young) Galapagos .... galapagensis
.. Pits between axial ribs and spiral cords well defined
... Pits deep, rounded
5.1 x 1.9 mm. San Pedro to Guadalupe Island .... pedroana Bartsch
... Pits subrhomboid
8.0 x 2.13 Gulf of California .... contrerasi Baker
. Median cord on last whorl not the strongest
.. Median cord equalling posterior or anterior on last whorl
... Pits between axial ribs and spiral cords ill defined
.... Tubercles of one or more cords truncated
..... Tubercles of posterior cord on last whorl the strongest
7.45 x 2.40 mm. Gulf of California .... chamberlaini Baker

..... Tubercles of all cords on last whorl equal
2.77 x 1.20 Gulf of California............. evermanni Baker
.... Tubercles not truncated
..... Tubercles small, more than 20 on last whorl
2.4 x 0.95 Gulf of California .... slevina Baker
..... Tubercles large, less than 20 on the last whorl
...... Peripheral cord narrow, tuberculate
4.55 x 1.69 mm. Gulf of California .... oweni Baker
...... Peripheral cord sinuous, scarcely tuberculate
4.0 x 1.75 mm. Gulf of California .... stephensi Baker
... Pits between axial ribs and spiral cords well defined
.... Pits deep, square
..... Tubercles not truncated
4.50 x 1.62 mm. Gulf of California .... escondidensis Baker
..... Tubercles of one or more cords truncated
...... Axial ribs uniformly retractive
4.0 x 1.5 mm. San Diego to Tres Marias Islands.. peninsularis Bartsch
...... Axial ribs angulated at the median cord
3.2 x 1.1 mm. Panama .... palmeri Strong & Hert.
.... Pits rectangular or oblong
..... Tubercles on one or more cords truncated
...... Tubercles of posterior cord the strongest
8.17 x 2.43 mm. Gulf of California .... hannai Baker
...... Tubercles of all cords equal on last whorl
4.8 x 1.5 mm. Panama .... alternata C.B. Adams
..... Tubercles not truncated
3.7 x 1.6 mm. Gulf of Calif. .... excolpta Bartsch
.. Median cord the weakest on the last whorl
... Pits between axial ribs and spiral cords ill defined
.... Tubercles of one or more cords truncated
6.5 x 2.0 mm. San Diego to Panama .... dalli Bartsch
.... Tubercles not truncated
..... Tubercles of posterior cord stronger than anterior
...... Axial ribs strongly protractive
8.8 x 2.0 mm. Gulf of California .... johnsoni Baker
...... Axial ribs not strongly protractive
3.4 x 2.1 mm. Galapagos .... adamsi Bartsch
..... Tubercles of anterior and posterior equal
5.3 x 2.2 mm. Catalina Island to San Martin id...catalinensis Bartsch
... Pits between axial ribs and spiral cords well defined
.... Pits deep, square
..... Tubercles of anterior cord truncated
5.1 x 1.8 mm. Gulf of California .... vanduzeei Baker
..... Tubercles not truncated
...... Tubercles of posterior and anterior cords equal
8.7 x 2.2 mm. Panama .... panamensis Bartsch
...... Tubercles of posterior cord stronger than anterior
4.1 x 1.1 mm. Panama ....inconspicua C.B. Adams
.... Pits oblong or rectangular
..... Tubercles of one or more cords truncated
...... Tubercles of posterior cord large,rounded
4.66 x 1.33 mm. Panama .... marshi Strong & Hertlein
...... Tubercles of posterior cord excavated posteriorly
5.1 x 1.6 mm. Pt. Sbreojos .... hemphilli Bartsch
..... Tubercles not truncated
4.1 x 1.1 mm. Gulf of California .... stearnsi Bartsch.

Genus Triphora Blainville,1828.

Triphora pedroana Bartsch,1907.	San Pedro to Coronado Islands
Triphora callipyrga Bartsch,1907	San Pedro to San Martin Island
Triphora catalinensis Bartsch,1907	Catalina Island
Triphora dalli Bartsch,1907.	San Diego to Panama.
Triphora peninsularis Bartsch,1907.	San Diego to Tres Marias Islands
Triphora stearnsi Bartsch,1907.	San Diego to Gulf of Calif.
Triphora hemphilli Bartsch,1907	Pt. Abreojos
Triphora excolpus Bartsch,1907	Cape San Lucas
Triphora hannai Baker,1926	Gulf of Calif.
Triphora evermanni Baker,1926	Gulf of Calif.
Triphora vanduzeei Baker,1926.	Gulf of Calif.
Triphora contrerasi Baker,1926	Gulf of Calif.
Triphora slavini Baker,1926	Gulf of Calif.
Triphora oweni Baker,1926	Gulf of Calif.
Triphora johnstoni Baker,1926	Gulf of Calif.
Triphora chamberlaini Baker,1926	Gulf of Calif.
Triphora escondidensis Baker,1926	Gulf of Calif.
Triphora cookeana Baker & Spicer,1935	Gulf of Calif.
Triphora stephensi Baker & Spicer,1935	Gulf of Calif.
Triphora inconspicua C.B. Adams,1852	Panama
Triphora alternatus C.B. Adams,1852	Panama
Triphora panamensis Bartsch,1907.	Panama to Ecuador
Triphora adamsi Bartsch,1907.	Galapagos- Nicaragua
Triphora palmeri Strong & Hertlain,1939	Taboga Island, Panama
Triphora marshi Strong & Hertlein,1939	Bahia Honda, Panama
Triphora galapagensis Bartsch,1907.	Galapagos
Triphora chathamensis Bartsch,1907.	Galapagos

ADDITION

Triphora dalli Bartsch,1907. Proc. USNM, no. 1569, vol. 33, pp 257-258, Pl. 16, fig.14, 1907. Type locality, Bay of Panama in 18 fms.

This species has not been regarded as a member of our fauna from San Diego northward. However, Mr. Strong's notebook lists a record from San Diego (Kelsey Coll.). There are several records of it from the Tres Marias Islands, Gulf of Calif. etc.

If Kelsey's record is good the range would be from San Diego to Panama.

Mr. Strong says of the species " Triphora dalli (Bartsch) is irregularly variegated with varying shades of brown,yellow and white. The median cord begins to develop on the fourth postnucular whorl and does not equal the strength of the other two, even on the last whorl. The entire surface is crossed by microscopic spiral and axial lines."

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Family Cerithiopsidae

Genus Cerithiopsis Forbes and Hanley,1851. Type (by monotypy),Murex tubercularis Montagu. Dr. A. Myra Keen advises " The date of Cerithiopsis Forbes and Hanley is 1851 (fide Sherborn).

The following description by Mr. A.M. Strong applies to the family. " Shell small,slender,turrited or subcylindrical,sculptured with two to four spiral cords, axial sculpture fainter or absent. The aperture is small with a short, truncated, straight canal."

The following keys to genera and species are from Mr. A.M. Strong's notebook. Following his list of species we will take up a detailed discussion of the species reported north of San Diego.

Family Cerithiopsidae

Genus
Spiral cords smooth, not tuberculate .... Seila
Spiral cords tuberculate
. Base truncate, shell exceedingly slender .... Metaxia
. Base not truncate, shell stouter .... Cerithiopsis
.. All nuclear whorls smooth .... (Cerithiopsis s.s.)
.. Lower nuclear whorls sculptured
... Sculpture of axial ribs only ....(Cerithiopsina)
.. Both axial and spiral sculpture present
... Fine spiral lirae in interspaces between axial ribs ..(Cerithiopsidella)
... Last nuclear whorl with two spiral cords ....(Cerithiopsida)

Genus Cerithiopsis

Spiral cords between sutures two Gulf of Calif. .... porteri B. H. & S
Spiral cords between sutures more than 2
. Spiral cords between sutures 3
.. Posterior spiral cord weakest on all whorls
... Sutures strongly channeled
.... Shell stout
..... Basal cords strong Monterey to Coronado Island.. berryi Bartsch
..... Basal cords feeble San Pedro to Coronado Island.. bakeri Bartsch
.... Shell slender Galapagos .... galapagensis Bartsch
... Sutures not channeled
.... Tubercles truncated posteriorly
..... Truncation sharp Panama .... neglecta C.B. Adams
..... Truncation moderate Guadalupe Island .... guadalupensis Strong
.... Tubercles rounded, not truncate
..... Whorls slopingly shouldered Lower Calif. ... halia Bartsch
..... Whorls not slopingly shouldered
...... Pits between cords equal
.... Pits rounded San Diego to Gulf of Calif. .... grippi Bartsch
.... Pits square
.... Shell stout San Pedro to Coronado Island.... diegensis Bartsch
.... Shell slender Panama .... adamsi Bartsch
.. Posterior spiral cord equalling the others on later whorls
... Sutures strongly channeled
.... Basal cords 2
..... Shell elongate ovate Galapagos .... curtata Bartsch
..... Shell elongate conic
...... Ribs and cords equal San Pedro to Pt. Abreojos.. oxys Bartsch
...... Ribs feeble, cords strong Tres Marias Ids. to Panama- anaitis Bartsch
.... Basal cords more than 2
..... Basal cords 3 Gulf of Calif. .... cerea Carp.
..... Basal cords 9 Gulf of Calif. ....sorex Carp.
... Sutures not strongly channeled
.... Shell less than 3 mm. in length
..... Shell stout, more or less pupiform
...... Pits between cords small, irregular
.... Pits about equal in size Cape San Lucas ...... brostolae B,H.&S
.... Tubercles rounded, not truncated
.... Basal cords 2 Gulf of Calif. .... pupiformis Carpenter
.... Basal cords 3 Panama ....eisseni S. & H.
..... Shell slender, elongate conic Pt. Abreojos ..... abreojosensis Bartsch
.... Shell more than 3 mm. in length
..... Shell 3 to 5 mm. in length
...... Base smooth Galapagos ....bicolor Bartsch

(con.)

...... Base sculptured

.... Base with sublamellar keels Panama .... infrequens C.B. Adms.

.... Base with rounded cords

.... Basal cords 5 Panama .... montezumi S. & H.

.... Basal cords 1 or 2

.... Peripheral cord exposed in suture Cape San Lucas.. kinoi B,H.&S

.... Peripheral cord not exposed in suture

.... Axial ribs on last whorl 32 San Pedro to Pt. Abreojos....
pedroana Bartsch

.... Axial ribs on last whorl 20-22

.... All tubercles rounded Gulf of Calif. .. tuberculoides Carpenter

.... Tubercles truncated posteriorly

.... Basal cord slender Gulf of Calif. ..... subgloriosa B,H. & S

.... Basal cords strong Panama .... gissleri S. & H.

..... Shell over 5 mm. in length

...... Basal cord 1, slender San Pedro to San Bartolome..carpenteri Bartsch

...... Basal cords more than 1

.... Basal cords 3, equal Monterey to San Bartolome.. cosmia Bartsch

. Spiral cords between sutures 4

.. Spiral cords wider than the interspaces Peru ..... peruviana d'Orbigny

.. Spiral cords narrower than the interspaces

... Spiral cords subequal Cape San Lucas .... aurea Bartsch

... Spiral cords decidedly unequal Panama ....destrugesi de Folin

Family Cerithiopsidae

Genus Seila A. Adams,1861.

Seila montereyensis Bartsch,1907. Monterey to Todos Santos Bay

Seila assumillata (C.B. Adams),1852 Gulf of Calif. to Peru

Genus Metaxia Monterosato,1884

Metaxia diadema Bartsch,1907. Monterey to Gulf of Calif.

Metaxia convexa (Carpenter),1856 San Pedro to Panama

Genus Cerithiopsis Forbes and Hanley,1851.

Subgenus Cerithiopsis s.s.

Cerithiopsis oxys Bartsch San Pedro to Pt. Abreojos

Cerithiopsis carpenteri Bartsch,1911 San Pedro to Lower Calif.

Cerithiopsis pedroana Bartsch,1907 San Pedro to Pt. Abreojos

Cerithiopsis bakeri Bartsch,1917. Reef Pt. to Coronado Islands

Cerithiopsis berryi Bartsch,1911 Monterey to Coronado Islands

Cerithiopsis grippi Bartsch,1917 Reef Point to San Diego

Cerithiopsis cesta Bartsch,1911 San Diego

Cerithiopsis halia Bartsch,1911 Todos Santos Bay to Cape San Lucas

Cerithiopsis abreojosensis Bartsch,1911 Pt. Abreojos

Cerithiopsis guadalupensis Strong,1938. Guadalupe Island

Cerithiopsis pupiformis (Carpenter),1857 Gulf of Calif.

Cerithiopsis aurea Bartsch,1911. Cape San Lucas

Cerithiopsis cerea Carpenter,1857 Mazatlan

Cerithiopsis sorex Carpenter,1857 Mazatlan

Cerithiopsis tuberculoides Carpenter,1857 Gulf of Calif. to

Cerithiopsis albonodosa Carpenter,1857 Mazatlan

Cerithiopsis subgloriosa B.H. & S.,1938 Gulf of Calif.

Cerithiopsis anaitis Bartsch Panama

Cerithiopsis galapagensis Bartsch Galapagos

Cerithiopsis gissleri Strong & Hertlein,1939 Bahia Hondo

Cerithiopsis montezumi Strong & Hertlein,1939 Bahia Hondo

Subgenus Cerithiopsida

Cerithiopsis diegensis Bartsch,1911 San Pedro to Coronado Islands

(con.)

Cerithiopsis rowelli Bartsch,1911	California
Cerithiopsis bristolae B. H. & S.,1938	Gulf of Calif.
Cerithiopsis cassi B. H. & S., 1938	Cape San Lucas
Cerithiopsis kinoi B. H. & S.,1938	Cape San Lucas
Cerithiopsis porteri B. H. & S., 1938	Gulf of Calif.
Subgenus Cerithiopsidella	
Cerithiopsis cosmia Bartsch,1907.	Monterey to San Bartolome Bay
Cerithiopsis fia Bartsch,1927.	Monterey to Laguna
Cerithiopsis alcima Bartsch,1911	San Pedro to San Geronimo Island
Cerithiopsis antifilosa Bartsch,1911	San Pedro to San Diego
Subgenus Cerithiopsina	
Cerithiopsis adamsi Bartsch,1911	Panama
Subgenus ?	
Cerithiopsis antemunda Bartsch,1911	San Pedro to San Diego
Cerithiopsis diomedae Bartsch,1911	San Diego to Todos Santos Bay
Cerithiopsis gloriosa Bartsch,1911	San Diego
Cerithiopsis arnoldi Bartsch,1911	San Pedro
Cerithiopsis lohri Jordan	Magdalena Bay, Pleistocene
Cerithiopsis neglecta C.B. Adams,1852	Panama
Cerithiopsis infrequens C.B. Adams,1852	Panama
Cerithiopsis destrugesi de Folin,1867	Panama
Cerithiopsis eiseni Strong & Hertlein,1939.	Bahia Honda
Cerithiopsis curtata Bartsch,1911	Galapagos
Cerithiopsis bicolor Bartsch,1911	Galapagos
Cerithiopsis peruviana d'Orbigny,1840	Peru

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Genus Cerithiopsis Forbes and Hanley,1851.
Subgenus Cerithiopsis s.s.

Cerithiopsis oxys Bartsch,1911 Cayucos,Calif. to Cape San Lucas, Mexico
Type locality, Point Abreojos, L.C., Mexico.

" Shell minute,dark brown, with three equal, tuberculate spiral cords, the tubercles on the upper cords rounded , on the median and lower cord truncated posteriorly. The periphery is marked by a strong cord with a second strong cord on the middle of the base." (A.M. Strong).

Collecting data: Cayucos,Calif.; Reef Point; (Strong); dredged off Redondo Beach, Calif. in 75 fms.; off Avalon, Catalina Island in 35 fms.; littoral on rocky reef at Arbolitos, Lower Calif., around the point from Punta Banda, the open surf (Burch); San Pedro (Lowe); San Martin Island, L.C. (Baker); Bird Rock and Ocean Beach (Baker); San Hipolito,L.C. (Hemphill) (San Diego Museum).

Crescent City, Calif. (Burch)
Cerithiopsis carpenteri Bartsch,1911. Venice, Calif. (Burch) to the Estero, Ensenada,Mexico (Burch). Type locality, Terminal Island, San Pedro Calif.

" Shell large for the genus,dark chocolate brown. Of the three tuberculate spiral cords the one at the summit is slightly the largest with the tubercles well rounded,the tubercles of the median cord are slightly truncated posteriorly and those of the anterior cord sharply so. Periphery marked with a deep groove, immediately below which is a broad cord. Base without additional sculpture." (A.M. Strong).

Collecting data: From sponge growing on the pilings under the Venice, Calif. amusement pier, Jan. 1940; dredged off Redondo Beach in 15 fms.; on sponge from Mission Bay, San Diego Co.; on sponge from Arbolitos,L.C.; also Punta Banda,L.C.; very abundant on sponge inside the Estero below Ensenada,Mexico; on sponge from wharf piles in Anaheim Bay; Crescent City, Calif. Aug.1936 (Burch); Spanish Bight, Coronado (Berry); San Diego Bay

(Baker); San Geronimo Island,L.C. (Lowe); Laguna Beach and Alamitos Bay (Lowe); Point Loma, San Diego Co. (W.K. Emerson).

Cerithiopsis pedroana Bartsch,1907. San Pedro, Calif. to Point Abreojos, L.C. Type locality, Terminal Island, San Pedro, Calif.

" The shell is rather large for the genus, dark brown, sculptured with three tuberculate spiral cords of which the upper is slightly smaller. The tubercles of the upper and median cords are axially elongated and those of the lower cord truncated posteriorly. The periphery is marked by a strong cord with a second strong cord on the middle of the base."

Collecting data: Common on yellow sponge growing on the eel grass in Mission Bay, San Diego Co. Jan.3,1940.(Burch); Anaheim Bay on sponge on oysters; So. Coronado Island (Baker); San Diego Bay (Baker); Catalina Island (Lowe); Coronado (Lowe) (San Diego Museum).

Cerithiopsis berryi Bartsch,1911. Monterey, Calif. to Point Abreojos,L.C. (Jordan). Type locality, 12 fathoms off Del Monte, Calif.

" Upper of the three nodulous spiral cords much the weaker on the upper whorls, on the last whorl almost equalling the other two. Periphery marked by a broad sulcus,immediately below which is a broad, rounded spiral cord and a second smaller cord on the middle of the base, while a third slender thread encircles the insertion of the columella . All tubercles are truncated posteriorly. The shell is uniformly brown." (A.M. Strong).

Collecting data: South Coronado Island (Baker); North Coronado Island (Stephens); La Jolla (Chaney) (San Diego Museum).

Cerithiopsis cesta Bartsch,1911. San Diego, Calif. Type locality, Government Jetty, San Diego. Figured by Oldroyd.

Cerithiopsis stejnegeri Dall,1884. Commander,Aleutian and Shumagin Islands, Alaska. Type locality, Bering Island. - to Queen Charlotte Ids.(Lowe)

Collecting data: Queen Charlotte Islands,B.C. (Lowe Coll. in San Diego Museum).

Cerithiopsis stejnegeri dina Bartsch,1911. Sitka, Alaska.

Cerithiopsis grippi Bartsch,1917. Off Newport, Calif. to Cape San Lucas, L.C. (Strong). Type locality, off San Diego.

" Shell chestnut brown, with the three spiral cords about equal. The tubercles of the upper and median spiral cords are well rounded while those on the lower cord are truncated posteriorly. Periphery of the last whorl marked by a broad groove. Base with two spiral grooves, one near the middle and the other encircles the insertion of the columella" (A.M. Strong).

Collecting data: 10 fms. Reef Point (Strong); uncommon in sand at La Jolla (W.K. Emerson); Ocean Beach (Baker).

Cerithiopsis halia Bartsch,1911. Proc. U.S.N.M., 40:344, pl.40, fig.8, no. 1823, 1911. San Diego, Calif. (Wilson) to Cape San Lucas, L.C. Type locality, Todos Santos Bay, L.C.

Inasmuch as this species was not listed in Bull. 112 nor the description in Oldroyd we are copying the original description as follows:

" Shell amsll, broadly elongate-conic, chocolate brown. (Early nuclear whorls decollated). Only the last volution remains, which is smooth. Postnuclear whorls strongly shouldered at the summit on early whorls, ornamented with three spiral cords, of which the first, at the summit, is very poorly developed; the second is situated at the posterior termination of

(con.)

the anterior third between the sutures; while the third which equals the second, is about halfway between this and the suture. In addition to the spiral cords, the whorls are marked by decidedly retractive, axial ribs which are almost equal to the spiral cords in strength. Of these ribs, 12 occur upon the first, 14 upon the second, 16 upon the third and fourth, 18 upon the fifth; and 20 upon the penultimate turn. The intersections of the axial ribs and spiral cords form well-rounded tubercles, while the spaces inclosed by them are elongated pits between the first and second spiral cord, and large, squarish pits between the second and third. Periphery of the last whorl marked by a sulcus not quite as broad as that which separates the supraperipheral from the median cord, and crossed by the continuations of the axial ribs. Base short, concave, marked by two spiral cords immediately below the peripheral sulcus and by numerous fine, incremental lines. Aperture subquadrate, decidedly channeled anteriorly; posterior angle obtuse; outer lip rendered sinuous at the edge by the external sculpture which is apparent in the aperture; columella short, curved, and twisted, with the free edge reflected; parietal wall glazed with a thin callus.

We have three specimens of this species, none of them quite mature. Cat. No. 32399, U.S.N.M., contains the type and another specimen from Todos Santos Bay, Lower California. The type has eight post-nuclear whorls and measures: Length 4.5 mm., diameter 2.1 mm. The third specimen (Cat. No. 16196)U.S.N.M.) comes from Cape San Lucas, Lower California"

Mr. A.M. Strong comments on this species as follows: " The upper of the three tuberculate spiral cords is much weaker than the other two and the tubercles on all cords are rounded, not truncated. The figure shows a young shell which has not developed the basal sculpture of the adult."

Collecting data: Point Loma, San Diego Co. (Miss E. Wilson); San Martin Island, L.C. and So. Coronado Island (Baker).

Cerithiopsis diomedae Bartsch, 1911. San Diego, Calif. to Todos Santos Bay. *Type locality*, San Diego Bay, Calif.

Dr. Dall placed this species here in Bulletin 112, but Mr. A.M. Strong states that the nuclear whorls are unknown and therefore the subgeneric classification is uncertain. He comments upon the species as follows:

" Shell brown, sculptured with three spiral cords of which the upper is the weaker. The periphery is marked by a strong cord and the base has a single, obsolete fasciole near the insertion of the columella."

Cerithiopsis *paramoea* Bartsch, 1911. Neah Bay, Washington.

Cerithiopsis bakeri Bartsch, 1917. Off Newport Calif. to San Martin Island, *Lower Calif.* *Type locality*, 7-10 fms. off South Coronado Island, L.C.

" Of the three nodulous spiral cords the one at the summit of the whorls is much the weakest on all whorls. The tubercles of the median and lower spiral cords are truncated posteriorly and the periphery is marked by a deep sulcus immediately below which is a strong spiral cord. Other spiral sculpture on the base consists of two fine threads. The shell is chestnut brown."

Collecting data: San Martin Island, L.C.; So. Coronado Island in 7-14 fms.; Bird Rock, San Diego Co. (Dr. F. Baker). 10 fms. Reef Point (Strong).

Cerithiopsis charlottensis Bartsch, 1917. Prince William Sound, Alaska (*W.J. Eyerdam- Nautilus 38:26*) to Puget Sound. Type locality, Queen Charlotte Islands, B.C. in 60 fms.

Cerithiopsis montereyensis Bartsch, 1911. Little River, Mendocino Co. to *Monterey, Calif.* *Type locality*, Monterey Harbor, Calif.

Subgenus Cerithiopsida Bartsch,1911.

Cerithiopsis diegensis Bartsch,1911. Redondo Beach, Calif. (Burch) to La Jolla and San Clemente and South Coronado Island, to Arbolitos,Mex.(Burch). Type locality, San Diego, Calif.

Collecting data: off Redondo Beach, Calif. in 25 fms. gravel; off Catalina Island in 35 fms.; Arbolitos, L.C., Mexico (around the point south of Todos Santos Bay). (Burch); Bird Rock, La Jolla (Baker); Pt. Vicente; Reef Pt.; Pt. Loma, San Diego Co. (Strong).

" Shell chestnut brown, sculptured with three tuberculate spiral cords, the posterior beginning as a slender thread on the third post-nuclear whorl and increasing in size until it about equals the other two on the last whorl. The periphery is marked by a strong cord, base smooth except for a slender thread at the insertion of the columella. This is the type of the subgenus" (A.M. Strong).

Cerithiopsis rowelli Bartsch,1911. Range ? Type locality stated to be from " Haliotis ,West coast of North and Middle America". Bartsch states " It probably came from California".

Cerithiopsis gloriosa Bartsch,1911. Point Firmin, Los Angeles Co., Calif. (Strong) south to Point Abreojos, L.C. (Eric Jordan). Type locality, Off San Diego, Calif. in 15 fms.

Collecting data: San Hipolito, L.C. (Hemphill) (San Diego Museum).

Cerithiopsis antemunda Bartsch,1911. Mugu, Ventura Co., Calif. (Burch) south to Estero of Todos Santos Bay, L.C. (Burch). Type locality, off San Diego, Calif.

Collecting data: Mugu, Ventura Co., Calif. on sponge; dredged off Redondo Beach, Calif. in 50 fms. rock and gravel; very abundant on yellow sponge inside the Estero de Todos Santos Bay. (Burch).

Subgenus Cerithiopsidella Bartsch,1911

Cerithiopsis cosmia Bartsch,1907. Moss Beach, San Mateo Co. (H.E. Vokes) to San Bartolome Bay, L.C., Mexico. Type locality, White's Point, San Pedro, Calif.

Mr. A.M. Strong notes " Questionably from the Gulf of California"

" Shell variegated with various shades of brown, white and wax yellow, sculptured with three tuberculate spiral cords of which the upper is the weakest on the first four postnuclear whorls but gradually increasing in strength until on the last whorl it is the strongest of the three. The periphery is marked with a spiral keel and the base with three spiral cords. This is one of the largest species in the genus and the color pattern is quite distinctive. It is the type of the subgenus." (A.M. Strong).

Collecting data: This is by far the most common species of the genus in our experience , with a great many collecting localities; Malaga Cove, Point Vicente, Dana Point; wharf pilings off Redondo Beach; Punta Banda, L.C.; Bird Rock, San Diego Co.; Arbolitos, L.C.; off Avalon, Catalina Island in 35 fms.; Portuguese Bend; Monterey, Calif. from Haliotis rufescens covered with sponge. (Burch); So. Island, Coronado Islands (Baker); San Martin Island, L.C. (Baker); Ocean Beach and San Diego (Baker); La Jolla (Bristol and Chaney); Laguna, San Pedro and White's Point (H.N. Lowe) (San Diego Museum).

Cerithiopsis antefilosa Bartsch,1911. Redondo Beach, Calif. (Burch) south to San Hipolito Point (Eric Jordan). Type locality, 8 miles off Point Loma Light, Calif.

(con.)

Collecting data: Off Redondo Beach in 25 fms. gravel; Malaga Cove in 10 fms.; off Avalon, Catalina Island in 35 fms.; Dana Point, Calif.; Pleistocene os San Pedro, Timm's Point and also of Baldwin Hills (Burch); South Coronado Island in 7 to 10 fms. (Baker); San Hipolito, L.C. (Hemphill) (San Diego Museum).

Crescent City, Calif. (Cooper)

Cerithiopsis alcima Bartsch,1911. Monterey, Calif. (Burch) south to San Geronimo Island (Lowe- Nautilus, vol. 27, p.27).

Type locality, White's Point, San Pedro, Calif.

" Shell chestnut brown, sculptured with three tuberculate spiral cords of which the upper is faint on the first five whorls, beginning on the sixth whorl it begins to increase in strength until on the last whorl it almost equals the other two. Periphery marked by a spiral cord, base with two strong cords and a slender fasciole." (A.M. Strong).

Collecting data: Off Monterey, Calif. in 15 fms.; off Redondo Beach, in 15 fms. (Burch); South Coronado Island in 7 to 10 fms. (Baker); San Geronimo Island, L.C. (Lowe); La Jolla (Chaney); Laguna (Lowe); Crescent City (Cooper) (San Diego Museum).

Cerithiopsis onealensis Bartsch,1921. Proc. Biol. Soc. Wash. 34:35.
Type locality, off O'Neal Island, Puget Sound.

Cerithiopsis fia Bartsch,1927. Proc. U.S.N.M. vol.70, no. 2660 (Apr.8, 1927), art.11, pp.26-27, pl. 5, figs 6,7.

Type locality, Monterey, Calif.

The original description follows: " Shell broadly conic, chestnut-brown. Nuclear whorls decollated excepting a portion of the last turn which has numerous slender distantly placed, retractively slanting axial threads and numerous fine spiral threads in the intercostal spaces which are placed ar right angles to the axial ribs. Postnuclear whorls moderately rounded, marked by almost vertical axial ribs of which 14 occur upon the first and second, 16 upon the third and fourth, 18 upon the fifth and sixth, 20 upon the seventh, and 22 upon the last turn. These ribs are about as wide as the spaces that separate them. In addition to the axial sculpture, the whorls are marked by three strong spiral cords of which the first at the summit is a little weaker than the rest. These cords render their junction with the axial ribs strongly nodulose. The nodules of the cord at the summit are rounded; those of the other two cords are truncated posteriorly and slope gently anteriorly. The pits inclosed between the axial ribs and spiral cords are almost rounded. Periphery marked by a strong spiral cord which is separated from the first supraperiphereal cord by a groove about as wide as that separating that cord from the median of the spire. The groove is crossed by the continuations of the axial ribs which extend feebly over the cord and render it weakly tuberculate. Base short, well rounded, marked by four strong spiral cords which grow successively weaker from those posterior anteriorly. Those are separated by grooves much narrower than the width of the cords, and they are rendered slightly tuberculated by the slender continuation of the axial ribs. Aperture subquadrate, decidedly channeled anteriorly; posterior angle obtuse; outer lip thin, showing the external sculpture within, rendered sinuous at the edge by the external sculpture; inner lip sigmoid.

The type, Cat. No. 340935 U.S.N.M., was collected by Mrs. T.S. Oldroyd at Monterey Bay, Calif. It has nine whorls, and measures, length 7.4 mm; diameter, 2.9 mm. Cat. No. 363781, U.S.N.M., contains a younger specimen collected by H.N. Lowe at Laguna, Calif. We give a figure of this also."

Range: Monterey, Calif. to Laguna Beach.

Cerithiopsis santacruzana Bartsch,1927. Proc. U.S.N.M. vol. 70, no. 2660 (Apr.8,1927), art. 11, p 27, pl. 5, fig.3.
Type locality, Santa Cruz, Calif.

The original description follows: " Shell stout, very broadly conic, pale brown. Early nuclear whorls decollated, the last one and one-half marked by very slender, distantly spaced, decidedly protractively slanting axial riblets, while the broad spaces between them are marked by slender raised threads which are placed at right angles to the axial riblets. Post-nuclear whorls moderately rounded , marked by strong, retractively slanting axial ribs. Of these, 16 occur upon the first to fourth, 18 upon the fifth, 20 upon the sixth and seventh, and 22 upon the penultimate turn. The spaces which separate the axial ribs are about as wide as the ribs. In addition to the axial sculpture, the whorls are marked between summit and suture by three strong spiral cords, of which the first, which is at the summit, is a little weaker than the other two on all the turns but the last. The junction of the axial ribs and spiral cords form strong tubercles which are truncated posteriorly and slope more gently anteriorly. The spaces inclosed between them are roundish pits. Suture moderately impressed. Periphery of the last whorl marked by a rather strong cord. The space separating this from the cords of the spire is crossed by the continuation of the axial ribs, which extend to the cord but do not cross it, nor do they tuberculate it. Base short, moderately rounded, marked by a spiral cord which is a little less strong than the one at the periphery from which it is separated by a channel a little narrower than that separating the peripheral cord from the first supraperipheral. Aperture subquadrate, decidedly channeled anteriorly; posterior angle obtuse; outer lip rendered wavy by the external sculpture; inner lip sigmoid.

The type, Cat. No. 363785 U.S.N.M. comes from Santa Cruz, California. It has 10 whorls and measures, length, 5.9 mm.; diameter , 2 mm. "

Incertae Sedis

Cerithiopsis columna Carpenter,1864. Vancouver Island to San Diego,Calif. (Hemphill). Type locality, Neah Bay, Washington.

Cerithiopsis arnoldi Bartsch,1911. San Pedro Bay, Calif.

Cerithiopsis truncata Dall,1886. Unalaska Island, Alaska to Puget Sound. Type locality, in the canals of sponges at Unalaska.

Cerithiopsis stephensae Bartsch,1909. Port Frederick, Alaska to Puget Sound. Type locality, Bear Bay, Peril Strait, Alaska.

Cerithiopsis ingens Bartsch,1907. Monterey, Calif.

Cerithiopsis tumida Bartsch,1907. Monterey, Calif.

Cerithiopsis fraseri Bartsch,1921. Clayoquot to Victoria and Nanaimo, British Columbia. Type locality, Clayoquot, B.C.

Range extended northward to Sitkalidak Island (Eyerdam). There is a set in the San Diego Museum from the Oldroyd collection from Kukak Bay, Alaska. Proc. Biol. Soc. Wash. 34:34

Cerithiopsis willetti Bartsch,1921. Forrester Island, Alaska to Puget Sound. Type locality, Forrester Island, Alaska.
Proc. Biol. Soc. Wash. 34:36

Corithiopsis signa Bartsch,1921. Proc. Biol. Soc. Wash. 34:36
Off O'Neal Island, Puget Sound.

Corithiopsis sassetta Dall,1919. # 2295, Proc. U.S.N.M., vol. 56, pp 344-345. -Off Point Pinos, Monterey Bay, in 66 to 69 fathoms, green mud.

The description of this species seems to have been left out by Mrs. Oldroyd. The original description follows:

" Shell small, slender, white with a pale olive periostracum, with more than seven whorls, the apex being eroded, the whorls moderately rounded, the suture distinct, not appressed; spiral sculpture of (on the spire four, on the last whorl five) equal and equally spaced rounddd cords with m more or less intercalary minute threading, on the early whorls; the anterior pair of cords are somewhat more prominent than the others; the base is disk-like, flattish, with six or more feeble spiral threads between the carinate margin and the imperforate axis; axial sculpture of (on the penultimate whorl about 17) rounded retractively arcuate riblots, with wider interspaces somewhat nodulous at intersections with the spiral cords, and becoming obsolete on the last whorl, on the spire they extend from suture to suture and on the last whorl to the base; there isalso irregular incremental threading; aperture ovate, lips simple, sharp, a shallow sulcus next the anterior end of the pillar lip; height, 6.5; diameter 2.5 mm. U.S. Nat. Mus. Cat. No. 271062. "

We seem to have no Recent species of the subgenus Cerithiopsina , but the species Corithiopsis necropolitana Bartsch,1911 is not uncommon as a Pleistocene fossil in the Timm's Point, San Pedro deposit.

Genus Seila A. Adams, 1861. Type (by subsequent designation Dall, 1889, Bull. Mus. Comp. Zool. Harvard College, vol.18, p. 250),- Seila dextroversus (Adams and Reeve) (Triphoris dextroversus Adams and Reeve). Recent Japan. (Fide Woodring, 1928).

" Shell small, very slender, whorls flat. Nucleus broken off on all available specimens of type species. Aperture broadly ovate, deeply notched at the base, though there is virtually no canal. Siphonal fasciole inflated, limited by a thread. Sculpture consisting of strong spiral keels (3 to a whorl on spire) between which lie microscopic growth threads." (Woodring).

Seila montereyensis Bartsch,1907. Monterey, Calif. to Gulf of California. Type locality, Monterey, Calif.

Collecting data: Monterey, Calif. in 20 fms. shale bottom; also in 10 fms. ; off Redondo Beach littoral to 25 fms.; off Avalon, Catalina Island in 35 fms.; common littoral species at Malaga Cove, Point Vicente, Pt. Fir-min, Dana Point, San Onofre, Bird Rock, La Jolla etc. (Burch); San Martin Island, L.C. (Baker); San Felipe, L.C. (Stephens); Magdalena Bay (Porter); Ballast Point, San Diego in 8 fms. (Baker); La Jolla (Bristol); Carmen Island, Gulf of Calif. (Lowe); Laguna and White's Point (Lowe); Reef Pt. and White's Point (Strong); La Jolla, Calif. (W.K. Emerson).

Seila assimillata (C.B. Adams),1852. Gulf of California to Peru.

This species not of our fauna but considered by Mr. Strong.

Genus Metaxia Monterosato,1884. Type (by subsequent designation, Cossmann,1906), Corithium rugulosum Sowerby.

" The shell is exceedingly slender, of many strongly convex whorls, sculptured with tuberculate spiral cords, the tubercles connected by axial threads. The base is truncate or concave between the periphery and the (con.)

insertion of the columella." (A.M. Strong).

Metaxia convexa (Carpenter),1856. San Pedro, Calif. (Baker) to Tres Marias Islands, Mexico. Type locality, Mazatlan, Mexico.

Mazatlan Catalogue, p. 444 (Dec. 1856). The description follows:

" Cerithiopsis testa gracili, albo-fusca, marginibus spirae rectis; anfr. x. normalibus, valde convexis, sutura profunda, eleganter cancellatis; costis spiralibus iv., super costas radiantes circiter xiii. undulantibus, ad intersectiones subnodosis; interstitiis quadratis, intus concavis; carina circa peripheriam haud tuberculosa; basi concava, sublaevi; apertura rotundata; labio distincto; haud prominente, rimam umbilicalem formente.".

" This beautiful species is cancellated as in Phos; and is remarkable for the convexity of the whorls. The nuclear whorls are decollated. Long. 18, long. spif. 146, lat. .056, div. 12 . Habitat, Mazatlan."

Specimens in Fred Baker collection from San Pedro and from South Coronado Island dredged in 6 to 8 fms.

Figured by Baker, Hanna and Strong, Proc. Calif. Acad. Sci. ser. 4, vol. 23, 1938, p. 224, pl.18, fig.4.

" The shell is pale brownish or white. The spiral cords are four, of which the one at the summit is much the weakest while the tubercles on the other three are prominent and well rounded. Carpenter says of it " is remarkable for the convexity of the whorls." (A.M. Strong).

Metaxia diadema Bartsch,1907. Monterey, Calif. to Gulf of California. Reported at Point Abreojos by Eric Jordan and at Guadeloupe Island by Strong and Hanna. Type locality, San Pedro, Calif.

" Shell dark brown. Except for this much darker color and a somewhat larger size, whorl for whorl, there is little by which this species can be separated from Metaxia convexa (Carpenter)." (A.M. Strong).

(Bartsch described from two cotypes , one from Monterey and one from Ocean Beach near San Diego. He makes no mention of a type. He adds the following note " This species has been confounded with the European Metaxia metaxae, under which name it has appeared in many lists ...)"

Collecting data; dredged off Malaga Cove, Los Angeles Co. in 10 fms.; off Redondo Beach, Calif. in 25 fms. in gravel; (Burch); off South Coronado Island (F. Baker); San Hipolito Point (Hemphill); La Jolla (Bristol); San Diego in 5 fms. (Lowe); San Pedro and San Clemente Island (Lowe); rare at La Jolla (W.K. Emerson).

* Before leaving this family the following comments under the species Seila montereyensis Bartsch by Mr. A.M. Strong should be of interest.

" This species has been known from the west coast under the name of Cerithiopsis assimilata C.B. Adams, a Panamic species, which is pygmy in size compared with the present form." (Bartsch). " Except for the difference in size, whorl for whorl, there seems to be little by which the two species could be separated.

(Bartsch has identified specimens from the Gulf of California as Seila mexicana Bartsch, I can find no reference to this name and it is probably a ms. name. In general the Gulf of California specimens are intermediate in size between those from Panama and Southern California.

(C. kanoni and C. moreleti de Folin are probably synonyms of Seila assimilata. See Tryon, vol. 9, 174 for reference).

The following key and list of species are from Mr. A.M. Strong's note-book.

Key to Genera and Subgenera of Cerithiidae

Columella with an oblique median plication .... Clava
Columella without a plication
• Aperture with an anterior canal
•• Shell large, surface with wide spaced knobs or spines ..Cerithium
•• Shell small, surface with close spaced spiral ribs .... Potamides
••• Shell turrited ....(Pirenella)
••• Shell subcylindrical ....(Liocerithium)
• Aperture with a rudimentary anterior notch, lip thickened .Cerithidea
• Anterior portion of aperture more or less channeled, lip thin
•• Aperture irregular, distinctly channeled anteriorly....... Bittium
••• Nuclear whorls with 2 spiral lirations
•••• Sculpture showing varices ....(Bittium)
•••• Sculpture regular, without varices ....(Lirobittium)
••• Nuclear whorls smooth
•••• Spiral sculpture predominating over axial .... (Stylidium)
•••• Spiral sculpture not predominating over axial ....(Semibittium)
•• Aperture oval, feebly channeled anteriorly .... Alabina
•• Aperture greatly expanded at junction of outer and basal lip ...
Diastoma.

Genus Clava Martyn,1784

Clava gemmatum (Hinds),1844.	Magdalena Bay to Peru
Clava maculata Martyn	Galapagos Islands

Genus Cerithium Bruguiere,1789.

Cerithium maculosum Kiener,1841.	Lower Calif. to Panama
Cerithium stercus-muscarum Val. 1833.	Cerros Island to Peru
Cerithium uncinatum (Gmelin),1791.	Gulf of Calif. to Panama
Cerithium mediolaeve Carpenter,1857.	Gulf of Calif. to Panama
Cerithium alboliratum Carpenter,1857.	Gulf of Calif.
Cerithium adustum Kiener,1841.	Panama to Ecuador
Cerithium billeheusti Petit	Ecuador and Galapagos
Cerithium nicaraguense Pilsbry & Lowe,1932	Nicaragua

Genus Potamides Brongniart,1810

Subgenus Pirenella

Potamides cyclus Dall,1919	Laguna Beach to Gulf of Calif.
Potamides interruptum (Menke),1850.	Pt. Sbreojos to Panama
Potamides galapaginus A. Adams	Gulf of Calif. to Galapagos
Potamides rissoinoides Carpenter (ms)	Gulf of Calif.

Subgenus Liocerithium

Potamides sculptum Sowerby,1855	Santa Barbara Island to Panama

Genus Pyrazus

Pyrazus humboldti (Val.),1833	Nicaragua to Panama

Genus Batillaria

Batillaria filosa (Philippi),1849.	Galapagos

Genus Cerithidea Swainson,1840

Cerithidea californica Haldeman,1840.	Baulinas Bay to San Martin Island
Cerithidea albonodosa Carpenter,1857	Gulf of California
Cerithidea fortiuscula (Bayle),1880	Panama to Ecuador
Cerithidea montagnei d' Orbigny	Magdalena Bay to Panama
Cerithidea mutata Pilsbry & Vanatta	Galapagos

Genus Bittium Gray,1847

Bittium johnstonae Bartsch,1911	Laguna to Lower Calif.
Bittium panamensis Bartsch,1911	Panama

Subgenus Stylidium

Bittium eschrichtii montereyensis Bartsch,1907.	Monterey to Gulf of Calif.
Bittium attenuatum Carpenter,1864	Forrester Island to San Martin Id.
Bittium purpureum Carpenter,1864	Monterey to San Diego
Bittium subplanatum Bartsch,1911	Monterey to Coronado Island
Bittium serra Bartsch,1917	Monterey to San Bartolome Bay
Bittium rugatum Carpenter,1866	San Pedro
Bittium armillatum Carpenter,1864	Santa Barbara to San Pedro
Bittium oldroydi Bartsch,1911	Destruction Island to Lower Calif.
Bittium quadrifilatum Carpenter,1864	Monterey to San Ignacio Lagoon
Bittium nitens Carpenter,1864	Gulf of Calif.
Bittium nicholsi Bartsch,1911	Gulf of Calif.
Bittium bartholomensis Bartsch,1917	San Bartolome Bay

Subgenus Lirobittium

Bittium interfossa Carpenter,1864	Monterey to San Diego
Bittium asperum lomaense Bartsch,1911	San Pedro to San Diego
Bittium catalinense Bartsch,1907	Catalina to San Diego
Bittium fetellum Bartsch,1911	Catalina
Bittium munitum munitoides Bartsch,1911	San Pedro to San Geronimo Island
Bittium larum Bartsch,1911	San Pedro to San Bartolome Bay
Bittium corralvoense Bartsch,1911	Gulf of Calif.
Bittium decussata Carpenter,1857	Mazatlan
Bittium mexicana Bartsch,1911	Gulf of Calif.
Bittium santamariensis Bartsch,1917	Santa Maria Bay
Bittium peruvianum d' Orbigny	Chilo
Bittium sulciferum Troschel	Peru

Genus Alabina Dall,1902.

Alabina californica Dall & Bartsch,1901	San Pedro
Alabina tenuisculpta (Carpenter),1864	San Pedro to Magdalena Bay
Alabina occidentalis (Hemphill),1894	San Diego to Tres Marias Islands
Alabina phanea Bartsch,1911	San Diego
Alabina diegensis Bartsch,1911	San Pedro to San Bartolome Bay
Alabina turrita (Carpenter),1866	San Diego
Alabina diomedae Bartsch,1911	Magdalena Bay to Gulf of Calif.
Alabina ignati Bartsch,1911	San Ignacio Lagoon
Alabina jordani Strong,1938	Guadalupe Island
Alabina crystalina (Carpenter),1864	Cape San Lucas
Alabina veraguaensis Strong & Hertlein	Bahia Honda, Panama

Genus Diastoma Deshayes,1861

Diastoma oldroydae Bartsch,1911	San Pedro
Diastoma stearnsi Bartsch,1911	San Diego
Diastoma fastigiata (Carpenter),1864	San Pedro
Diastoma sloveni Strong,1938	Guadalupe Island
Diastoma chrysalloides Bartsch,1911	Gulf of Calif.

Note- As a rule Mr. Strong does not list species confined to the range north of Point Conception.

Additions and Corrections

The following reports were received after typing the discussion in this issue.

Bursa californica (Hinds)- 12-60 fathoms in Monterey Bay, fairly common (A.G. Smith)

Argobuccinum vs. Fusitriton- " Hertlein thinks the latter appears to be applicable to oregonensis." This was out conclusion on page 5.

Fusitriton oregonensis (Redfield)- Woody Id.; Dutch Harbor; Unalaska Id.; Nash Harbor; Nunivak Island, Alaska (CAS); Vancouver Island (CAS); 15-60 fms. in Monterey Bay. (A.G. Smith).

Triphora montereyensis Bartsch- Monterey, in beach drift and dredged in 15 fms. (A.G. Smith).

Triphora pedroana Bartsch- Uncommon in sand at La Jolla, Ocean Beach etc. (W.K. Emerson).

Cerithiopsidae- Mr. Allyn G. Smith comments on this group " I have found an examination of the nucleus of specimens in this difficult group to be very helpful in identification, especially when a lot contains more than one species, as is not infrequently the case. Of course, when the nucleus is not present or badly eroded, the difficulty of identification is increased considerably."

Cerithiopsis- The following species are reported from Monterey Bay and vicinity-

berryi Bartsch- 5-30 fms.
columna Carpenter- Low tide and in 10 fms.
cosmia Bartsch- Beach drift
diegensis Bartsch- Low tide to 20 fathoms. (This record from Mr. A.G. Smith is an extension of the range as we had it on page 17- the range should then be from Monterey south to Arbolitos, L.C.
fia Bartsch- Shore to 25 fathoms
montereyensis Bartsch- Shore to 25 fms.
rowelli Bartsch- 25 fms. Also 25 fms., Carmel Bay. This is the only record we have received of this species.
santacruzana Bartsch- 3-30 fms. Range- Santa Cruz and Monterey Bay.
tumida (Bartsch)- shore

Cerithiopsis ingens (Bartsch),1907. Proc. U.S.N.M. 33:180. Originally described as Bittium quadrifilatum ingens Bartsch,1907. The description is in Oldroyd, 2-3-p 25. Type locality, " Albatross" Station 4475, ten miles off Pinos Light, Monterey, Calif. Mr. A.G. Smith advises that this is 58-85 fms. (USFC).

Mr. W.J. Eyerdam reports the following data on Cerithiopsis.

Cerithiopsis stejnegeri Dall,1884. Illuliuk Harbor, Unalaska, Aleutian Islands, 1932- 10 fms. mud- Coll. by W.J. Eyerdam.

Cerithiopsis stegnegeri dina Bartsch,1911. Drier Bay, Knight Island, Pr. Wm. Sound, Alaska- dredged in 1923 by W.J. Eyerdam.
* Note* See our listing on page 15- this is an extension of range northward from Sitka, Alaska.

Cerithiopsis charlottensis Bartsch,1917. Drier Bay, Knight Island, 1923 and Raspberry Island, Kodiak group, Alaska,1945 on bread sponges.

Cerithiopsis onealensis Bartsch,1921. Smith's Cove, Seattle,1920- on drawn piling; Drier Bay, Knight Island, Alaska 1923- coll. by W.J. Eyerdam.
* Note*- This is a great extension of range northward from Puget Sound- see our listing on page 18 and change the range.

Cerithiopsis stephansae Bartsch,1909. Shuyak Strait, Afognak Id.,Alaska under stones on sponges- Eyerdam. * Note* Extension of range northward from Port Frederick, Alaska. See Page 19 and change.

Additions and Corrections (con.)

Cerithiopsis sassetta Dall,1919. We published the original description again on this species- page 20 this issue, and commented that it seemed to have b been left out by Oldroyd and others. We had received no information about it from anyone. However, Mr. Allyn G. Smith comments on it, and perhaps he has the reason for its general ommission. Mr. Smith says " We left Cerithiopsis sassetta Bartsch out of the Monterey list on the basis that it was the same as Bittium serra Dall. I cant't find the authority for this because of the lack of time at the moment. Maybe Strong knows where and when this change was made. I would very much like to check it."

Cerithiopsis willetti Bartsch,1921 and Cerithiopsis signa Bartsch,1921.
We were unable to place these species subgenerically. Mr. A. Smith comments " It is my impression that C. willetti and C. signa belonged to the section Cerithiopsina. Maybe you can check this."

We will appreciate knowing this as well as additional data on many of the others.

Seila montereyensis Bartsch- Low tide to 30 fms., Monterey Bay (A.Smith).

Metaxia diadema Bartsch- Monterey Bay, shore to 30 fms.

Family Cerithiidae

In the first place we have the problem of the family name or names. Some recent authors have been using Potamididae. Bequaert, Jos. C. in Johnsonia #5 opens his paper with the statement " Cerithidea and Batillaria and the two western Atlantic genera of Potamididae". Thiele uses the family name Potamididae, as used by Bequaert, and Cerithiidae divided into two subfamilies, the first of which is Litiopinae which corresponds to the family we have been using, Litiopidae including the genera Alaba, Diala, and Litiopa. Thiele then places Barleeia under Rissoidae. His arrangement is quite different. Grant and Gale, of course, followed their custom of using the oldest genus resulting in Clavidae. It is scarcely fitting that we should attempt in such papers as these to discuss the findings in such papers as Dall, 1907 " On the Synonomic History of the Genera Clava Martyn, and Cerithium Bruguiere. However, in the light of Winckworth's recent paper in Proc. Mal. Soc. London it does seem that we must sooner or later decide whether or not to accept the Martyn generic names or reject them. In a letter (Per. Comm. Sept.'45) Dr . A. Myra Keen says " I believe we shall have to follow Winckworth in rejecting Martyn's names, I had hoped we might salvage the generic names on the ground that he was binary if not binomial, but evidently Winckworth opposes that course. Martyn's nomenclature certainly is inconsistent, and it may well be that we had best abandon him. However, I do regret to see Purpura go, as it means substituting that name for Thais ." Dr . Joshua L. Baily Jr. (Per. Comm. Sept. 1945) advises " It makes little difference whether you accept Clava or Cerithium. In either case you will have to give the reasons for each side in the question. Sooner or later the International Commission will have to rule on Martyn, and until then I shall continue to use Cerithium. Since neither of these is found in California you could dodge the issue by simply using Potamididae. This cannot be used as a substitute for the older name, but if the old family be divided into two the genus Potamides is available for type for one of them. I suspect that Potamides is probably as closely related to Melania as it is to typical Cerithium. But if you use Potamididae you had better check the spelling with some Greek scholar. I have seen it spelled Potamidae and I do not know which is correct"

In our Minutes # 16, October 1942 we published a three page paper " Notes on Cerithiidae" by A.M. Strong. We are not restating that discussion here. This paper was largely a consideration of some conclusions stated by J.C. Bequaert in Nautilus56:20,1942 " Random Notes on American Potamididae" Later in Nautilus 57:30 Bequaert published a note " Cerithidea Hegewischii (Philippi) a Pacific Coast Shell."

A key to west American genera and subgenera of the family Cerithiidae is found in Baker, Hanna and Strong " Proc. Calif. Acad. Sci. 4th Ser. vol. 23, no. 15, p. 224, 1938.

Genus Diastoma Deshayes,1850. (Atlas, Traité Elém. p. 46). Type (? by monotypy): D. costellata Deshayes (= Melania costellata Lamarck, fide Cossmann) (Above on advice of Dr. A.M. Keen).

" Shell turreted, whorls with numerous transverse ribs, and with a few intermediate varices. Inner margin of the aperture partially detached from the previous whorl; the aperture itself is strongly contracted posteriorly. " (Tryon).

The most important reference on this group is Bartsch, Paul Proc. U.S.N. M. no. 1802, vol.39, pp. 581-584, " The Recent and Fossil Mollusks of the Genus Diastoma from the West Coast of America" (4 text figures).

In this paper Dr. Bartsch explains a few terms used as follows:

" Axial sculpture", the markings which extend from the summit of the whorls toward the umbilicus.

The axial sculpture may be-

" Vertical", when the markings are in general parallelism with the axis of the shell,

" Protractive", when the markings slant forward from the preceding suture.

" Retractive", when the markings slant backward from the suture

" Spiral sculpture", the markings following the directions of the coils of the whorls.

Diastoma fastigiata (Carpenter),1864. This was described as Bittium by Carpenter from the Pleistocene of Santa Barbara, Calif. Figured in Oldroyd pl. 73, fig.1. Mr. A.M. Strong lists this as Recent from San Pedro, Calif. Miss Viola Bristol of the San Diego Museum reports that there are specimens in the collection there without collecting data.

Diastoma oldroydae Bartsch,1911. San Pedro, Calif.

Diastoma stearnsi Bartsch,1911. San Diego, Calif.

Genus Alabina Dall,1902. Type (by original designation), Bittium cerithidioidea Dall. Dall,1902, Nautilus, 15:11, p.127

" Shell small, slender, body whorl varicose. Nucleus slender, consisting of about three glassy smooth whorls enlarging less rapidly than the postnuclear whorls. Aperture subcircular. Basal lip extended and everted, producing a suggestion of a canal. Behind the inner lip lies a narrow umbilical groove. Sculpture consisting of narrow curved axial ribs and obscure spiral threads." (Woodring, 1928, Carnegie Inst. of Wash. p 338).

The most important reference on this group is Bartsch, Paul, Proc. U.S. N.M. no. 1790, vol. 39, pp 409-418, pls. 61-62, 1911, " The Recent and Fossil Mollusks of the Genus Alabina from the West Coast of America".

In this paper Dr. Bartsch published a key to species which we take the liberty of copying for the convenience of the members. See following page.

Key to the Genus Alabina (Bartsch)

Shell without sculpture .... *turrita*
Shell sculptured
. Shell without axial sculpture (except lines of growth)
.. Shell with a single spiral cord between the sutures... *occidentalis*
.. Shell with five low, spiral cords between the sutures ..*barbarensis*
. Shell with axial sculpture
.. Axial ribs strong
... Spiral sculpture consisting of broad cords
.... Shell large; adult more than 6 mm. long .... *hamlini*
.... Shell small; adult less than 4 mm. long .... *phanea*
... Spiral sculpture not consisting of broad cords
.... Spiral sculpture consisting of slender cords
..... Shell slender, conic .... *diomedae*
..... Shell stout, broadly conic .... *ignati*
.... Spiral sculpture consisting of incised lines....... *californica*
.. Axial ribs slender or obsolete
... Axial ribs broad, but feebly developed
.... Spiral sculpture absent .... *io*
.... Spiral sculpture present ....*t. phalacra*
... Axial ribs slender
.... Adult shell less than 5.5 mm. long..................... *monicensis*
.... Adult shell more than 7 mm. long
..... Spiral sculpture obsolete between the sutures ..... *tenuisculpta*
..... Spiral sculpture strong between the sutures .... *t. diegensis*

Alabina californica (Dall and Bartsch)1901. Described as *Bittium* from *the Pleistocene of San Pedro, Calif.*

Collecting data: If there are any Recent records of this species I have not heard of them. We have found it very common in the Pleistocene of Timm's Point and Hilltop Quarry, San Pedro but have never seen it living. (Burch) .

Alabina barbarensis Bartsch,1911. Santa Barbara, Calif. Pleistocene
Alabina hamlini Bartsch,1911. Los Angeles, Calif. Pleistocene
Alabina phanea Bartsch,1911. San Diego, Calif.
Alabina io Bartsch,1911. Signal Hill, Long Beach, Pleistocene
Alabina tenuisculpta (Carpenter),1864. San Pedro, Calif. to Magdalena Bay. *Type locality, San Diego, Calif.*

Collecting data:Newport Bay, Calif. ; Estero, Ensenada, Mexico; Mission Bay; San Diego Bay (Burch); Mission Bay (Dr. F. Baker); San Diego Bay (Dr. Baker and Orcutt); San Pedro, Calif. (Lowe); Magdalena Bay, L.C. (Lowe) (San Diego Museum).

Alabina tenuisculpta phalacra Bartsch,1911. San Diego, Calif.

Collecting data: *Mission Bay*, dredged by Dr. F. Baker.

Alabina diegensis Bartsch,1911. San Pedro, Calif. to San Bartholome Bay, *L.C. Type locality*, San Pedro. Originally described as a variety of *tenuisculpta*.

Alabina calena Dall, 1919. Off San Luis Obispo Bay, Calif. in 252 fms.
Alabina turrita (Carpenter),1866. San Pedro to San Diego.
Type locality, San Pedro. Figured in Oldroyd and Bartsch.
Alabina occidentalis(Hemphill)1894. San Diego, Calif. to Tres Marias *Islands, Mexico.* Type locality, San Diego, Calif. on mud flats.

Collecting data: Tres Marias Islands, Mex. (Baker Collection in San Diego Museum); Estero below Ensenada,Mexico (Burch).

There are several species listed above that seem to be known only from the fossil. We will appreciate knowing if there are any known Recent records of them. Otherwise they should be dropped from our final faunal list.

Genus Bittium ("Leach ") Gray, 1847. Gray, Oct. 1847, Ann. Mag. Nat. Hist. vol.20, p. 270. Type (by subsequent designation, Gray, Nov. 1847, Proc. Zool. Soc. London, p. 154)- Murex reticulatus Montagu (= Strombiformis reticulatus Ba Costa). Recent European seas. Fide Woodring 1928.

" Shell small, very slender, spire high, body whorl small. Whorls varicose. Nucleus consisting of about four glassy smooth whorls. Aperture ovate, anterior canal broad, very stout, unemarginate. Sculpture consisting of axial ribs, overridden by spiral threads that are swollen on the axials." Woodring (Carnegie Inst. of Wash. 1928, p. 336).

Refer back to page 22 for Strong's key to genera and subgenera. The most important reference on this group is Bartsch, Paul " Proc. U.S.N.M. no. 1826, vol.40, pp. 383-414, pls. 51-58,1911 " The Recent and Fossil Mollusks of the Genus Bittium from the West Coast of America". Inasmuch as Dr. Bartsch has published in this paper the best key to species we have, and it is not available to all members we are taking the liberty of copying it.

Key to the Species of the Subgenera Semibittium, Lirobittium and Those of Uncertain Subgeneric Position. (Bartsch)

Spiral sculpture consisting of three strong cords between the sutures, between which intercalated slender cords may occur.
. Nodulose spiral keel at the summit less strong than the other two
.. Base with two very strong sublamellar keels .... interfossa
.. Base with slender spiral cords
... Peripheral cord exposed as a smooth band in suture .... catalinense
... Peripheral cord not apparent in the sutures ....c. inornatum
Nodulose spiral keel at the summit equal to the other two
. Axial ribs and spiral cords comparatively weak, always narrower than the squarish pits inclosed by them.
.. Junctions of axial ribs and spiral cords forming sharp cusps.
... Whorls with a strong shoulder .... oldroydae
... Whorls not shouldered .... fetellum
.. Junctions of axial ribs and spiral cords forming well-rounded tubercles.
... Shell large, unicolor, rusty-white (fossil).......... armillatum
... Shell small, wax-yellow, variegated with chestnut, usually with a broad chestnut, basal band.
.... Adult shell more than 6 mm. long .... purpureum
.... Adult shell less than 6 mm. long .... decussatum
. Axial ribs and spiral cords always strong and wider than the spaces inclosed by them.
.. Shell very large, with strong intercalated spiral cords .. ornatissimum
.. Shell smaller, without, or with very weak intercalated spiral cords only .
... Shell dark purplish-brown .... vancouverense
... Shell wax-yellow, banded with brown
.... Shell robust, with 25-30 axial ribs on its last whorl.. munitum
.... Shell smaller, with as many as 40 axial ribs on its last whorl... m. munitoide

Spiral sculpture, consisting of four strong cords between the sutures, between which intercalated slender cords may occur.
. Axial ribs becoming obsolete on the last whorls of the adult shell.
.. Summit of the whorls appressed.
... Intercalated spiral cords absent.
.... Shell slender, sculpture weak .... attenuatum
.... Shell robust, sculpture strong ....a. boreale
... Intercalated spiral cords present ....a. multifilosum
.. Summit of the whorls slopingly shouldered ....a. latifilosum

(con.)

. Axial ribs strong on all the whorls
.. Nodulose spiral cords at the summit less strong than the others.
... Spiral cords sloping gently anteriorly until fused with the body of the shell; posteriorly they are suddenly truncated.
.... Axial ribs on the last whorl 12-15
..... Shell of 10 post-nuclear whorls 8.1 mm. long .... asperum
..... Shell of 10 post nuclear whorls 7.1 long .... a. lomaense
.... Axial ribs on the last whorl about 25.................subplanatum
.. Nodulose spiral cords at the summit equal to the rest on ~~the last~~ whorl.
... Adult shell more than 17 mm. long.
.... Shell slender .... giganteum
.... Shell stout
..... Intercalated cords when present very feeble .... casmaliense
..... Intercalated cords always present, a t times more than one between the strong cords and almost equal to them in strength.. arnoldi
... Adult shell less than 13 mm. long.
.... Whorls decidedly overhanging
..... Base well rounded .... rugatum
..... Base flattened
...... Early post-nuclear whorls with 4 spiral cords .... larum
...... Early post-nuclear whorls with 2 spiral cords .... cerralvoense
.... Whorls not overhanging
..... Shell large; adult shell more than 11 mm. long ...... quadrifilatum
..... Shell small; adult shell less than 7 mm. long
...... Whorls shouldered at the summit .... nicholsi
...... Whorls appressed at the summit
.... Axial ribs on the last whorl 15 .... mexicanum
.... Axial ribs on last whorl 32 .... nitens

Subgenus Bittium s.s.

Bittium johnstonae Bartsch,1911. Laguna Beach, Calif. to Lower Calif. Type locality, Lower Calif.

Subgenus Stylidium Dall,1907. Type (by original designation), Bittium eschrichtii (Middendorff).

Bittium eschrichtii (Middendorff),1849. Craig and Drier Bay, Alaska south to Crescent City, Calif. Type locality, Sitka, Alaska.

Collecting data: The situation in my experience with this species has been to find the northern specimens heavier and coarser. Dr. Bartsch in his description of the variety montereyense states that it differs by being less strongly keeled, much more smooth, more slender etc. There is no doubt but that the southern specimens do fit the description and are perhaps properly given a subspecific name. However, the place to divide them is the problem. The above range as given by Dall gives the extreme southern range as Puget Sound. I can see no difference between specimens collected at such places as De Poe Bay, Oregon and even Crescent City, Calif. and those from the far north. Those from Monterey do seem to be quite different. (Burch). W.J. Eyerdam reports an extension of range northward as indicated by the range stated above. Eyerdam reports the species from Craig, Pr. of Wales Island, and Drier Bay, Knight Island, Alaska. He also reports the species common in Puget Sound. Other records- Orcas Island, Puget Sound in 10 to 30 fms. (Dr. F. Baker); Cape Foulweather, Ore. (Orcutt); Tacoma, Wash. (Lowe) (San Diego Museum).

Bittium eschrichtii montereyense Bartsch,1911. Crescent City, Calif. to Cape San Lucas, L.C. Type locality not stated in description by Bartsch.

Collecting data: Abundant on algae at low tides Monterey, San Simeon, Cayucos (Burch); Crescent City, Calif. (Chace); Pacific Grove (Chaney); Cayucos (Caruthers and Strong); Monterey (Lowe).

Bittium eschrichtii icelum Bartsch,1911. Fuca Strait to Monterey, Calif. Type locality, Neah Bay, Wash.

Dr. Bartsch states that this variety shows axial ribs on all turns. I have never identified such a specimen and neither has any of the other members. (Burch).

Bittium paganicum Dall,1919. Off Monterey Bay, Calif. in 356 fathoms.

Subgenus Semibittium Cossmann, 1896. Type, Cerithium cancellatum Lamarck. " Spiral sculpture not predominating over the axial."

Bittium vancouverense Dall and Bartsch,1910. Drier Bay, Alaska (Eyerdam) south to Vancouver Island, B.C. Type locality, Barkley Sound, Vancouver Island, B.C.

Collecting data: Drier Bay, Knight Island, and Raspberry Island,Alaska (W.J. Eyerdam); Ketchikan, Alaska (G. Willett); Vancouver Island (Lowe); Bear Bay, Peril Straits, Alaska (Lowe) (San Diego Museum).

Bittium attenuatum Carpenter,1864. Forrester Island, Alaska to San Martin L.C. (Baker) and San Geronimo Island (Lowe).
Type locality, Monterey, Calif.

Collecting data: Monterey, Calif. littoral in algae and dredged in 10 fathoms on the shale off Del Monte; dredged off Avalon, Catalina Island in 35 fms.; Pleistocene from Timm's Point, Hilltop Quarry and Knobb Hill, San Pedro (Burch); South Island, Los Coronados in 3 to 7 fms. (Dr. F. Baker); San Martin Island, L.C. (Dr. Baker); San Geronimo Island, L.C. (Lowe); San Benito Island, L.C. (Lowe); Laguna Beach and Newport Beach, Calif. (Lowe); Catalina Island (Oldroyd); San Pedro (White) (San Diego Mus.

Bittium attenuatum boreale Bartsch,1911. Gravina Island near Ketchikan, Alaska (Boucher) to Vancouver Island, B.C. Type locality, Barkley Sound, Vancouver Island, B.C.

The northern extension of range was reported to us by Dr. A. Myra Keen " by V.J. Boucher (specimen in Stanford collection).

Bittium attenuatum multifilosum Bartsch,1907. Monterey to San Martin Island, L.C. (Dr. F. Baker). Type locality, White's Point, Los Angeles Co.,Calif.

Collecting data: San Martin Island, L.C. (Dr. Fred Baker); San Pedro (Oldroyd) (San Diego Museum)

Bittium attenuatum latifilosum Bartsch,1911. Terminal Island, Calif. to San Martin Island, L.C. (Dr. F. Baker). Type locality, Terminal Island.

Collecting data: San Martin Island, L.C. and San Diego, Calif. (Dr. Baker

Bittium subplanatum Bartsch,1911. Monterey south to Coronado Island, L.C. Type locality, Catalina Island, Calif.

Collecting data: This is as good a place as any to suggest that the subgeneric divisions of Bittium work much better on paper than they do in actual practice. Typical specimens of B. subplanatum are so amazingly common in spots off Redondo Beach particularly in mud bottom and between 100

(con.)

and 150 fms., that in dredging we would simply spread the countless thousands of *Bittium* out on the table and pick out other small forms from the *Bittium*. We also dredged them in as shallow as 50 fathoms and off Catalina Island in 35 fathoms.

However, the interesting feature of these large lot of specimens (of which we will gladly send a large lot to any student wishing to make a detailed study) is that with them we find large numbers of typical *Bittium catalinense* Bartsch in the Catalina Island material although even the *B. catalinense* seem to vary off Redondo Beach in the deeper dredgings by becoming longer and narrower than the Catalina Island specimens.

Mr. George Willett always insisted that they are two good distinct species but I could never see it because, in sorting, the intergrades were common in every degree. So clear was this intergradation that I mailed a lot to Dr. Paul Bartsch with no comments and he wrote that we seemed to have intergraded *subplanatum* and *catalinense*. And the meaning of this is also obvious since this means intergrading specimens of the subgenus *Semibittium* with specimens of *Lirobittium*. I have found the subgenera of very little aid in actual work. (Burch),
Reported from San Pedro (Dr. F. Baker).

Bittium rugatum Carpenter,1866 . San Pedro and Catalina Island (Dall). to Todos Santos Bay, L.C. (Eric Jordan).
Type locality, Lower Pleistocene of Santa Barbara, Calif.
Collecting data: South end of San Clemente Island (Dr. F. Baker); La Jolla (Bristol); San Diego (Orcutt) (San Diego Museum).
I have never taken a Recent specimen of this quite distinctive species although I have it in any number from the Pleistocene of Hilltop Quarry and Timm's Point of San Pedro , and from the Del Rey, Baldwin Hills deposit although rare there. (Burch).

Bittium quadrifilatum Carpenter, 1864. Monterey, Calif. to San Ignacio Lagoon, L.U. Type locality, San Diego, Calif.
Collecting data: In our experience this is one of the most common of littoral species of this genus. It is certainly confined to very shallow water as we have never dredged it other than close to shore or once inside Newport Bay in shallow water. We have it from Monterey, Calif. in algae; Mission Bay; Bird Rock and Point Loma, San Diego Co.; Malaga Cove, L.A. Co.; San Onofre; Ocean Beach etc. (Burch); San Ignacio Lagoon, L.C. (Lowe); La Jolla (Bristol); Point Loma in 30 fms. (Baker); San Diego (Baker, Hemphill and Stephens) (San Diego Museum); Mission Beach (Roy L. Morrisson) " very common in eel grass patches in Mission Bay" (W.K. Emerson).
The subspecies *B. q. ingens* Bartsch,1907 was covered under *Cerithiopsis*.

Bittium armillatum Carpenter,1864. Santa Barbara and San Pedro, Calif. south to San Martin Island, L.C. (Baker). Type locality, Lower Pleistocene of Santa Barbara, Calif.
Collecting data: Living from San Pedro Bay; Pleistocene of Hilltop Quarry (Burch); Todos Santos Bay, L.C. (Orcutt).

Bittium purpureum (Carpenter),1864. Monterey to San Martin Island,L.C. (Baker). Type Locality, Monterey and Santa Barbara, Calif.
Collecting data: Dredged off Redondo Beach in 25 fms., gravel; off Avalon, Catalina Island in 35 fms.; Pleistocene of Hilltop Quarry (Burch); rare in kelp holdfasts at Mission Beach (W.K. Emerson); San Martin Island, L.C. (Baker); San Diego (Baker); San Pedro (Strong and White); Portuguese Bend, Los Angeles Co. (Lowe).

Bittium challisae Bartsch,1917. San Juan Island, Gulf of Georgia.

Bittium sanjuanense Bartsch,1917. San Juan Island, Gulf of Georgia.
Collecting data: Specimens dredged off San Juan Islands by Trevor Kincaid Olga, Wash. (Engberg).

Bittium serra Bartsch,1917. Off Point Pinos to San Diego, Calif. in 75 fms and San Bartholome Bay, Lower Calif.
Type locality, off Point Loma Light, Calif. in 71-75 fathoms.

Subgenus Lirobittium Bartsch,1911. Type (by original designation), Bittium catalinense Bartsch,1907.

Bittium interfossa Carpenter,1864. Monterey to San Martin Island, L.C. (Baker Type locality, Monterey, Calif.
Collecting data: Malaga Cove, L.A. Co.; Dana Point and San Onofre, Orange Co.; Portuguese Bend, Los Angeles Co.- all littoral (Burch). We have specimens from deep water differing slightly and labelled cf. interfossa. I do not know what they are. (Burch); rare in Mission Bay (W.K. Emerson); San Martin Island, L.C. (Baker); So. Coronado Island in 14 fms. (Baker); Ocean Beach (Baker); San Diego (Hemphill); La Jolla (Chaney and Bristol); San Pedro (Lowe), (San Diego Museum).

Bittium catalinense Bartsch,1907. Catalina Island to San Martin Island, L C (Baker). Type locality, Pleistocene at Santa Barbara, Calif.
Collecting data: This species was discussed above under subplanatum. It is possible that we have a subspecies of catalinense in those deep water longer and narrower specimens, but it is my opinion that this species runs right into subplanatum and perhaps others. Abundant in from 75 to 200 fms. off Redondo Beach and Catalina Island. Not uncommon in the Pleistocene of Hilltop Quarry and Timm's Point of San Pedro (Burch); San Martin Id. L.C. (Baker); Catalina Island in 40 fms. (Strong); Catalina Island in 35 fms. (Lowe).

Bittium catalinense inornatum Bartsch,1911. Catalina Island to San Diego, Calif. Type locality, Catalina Island, Calif.
Collecting data: The described " spiral keel" in the suture ranges, from none to sharp in my experience. When you think you have inornatum put it under a stronger glass and you may note indications of a keel. I have never been able to label a specimen with this name. (Burch).

Bittium ornatissimum Bartsch,1911. San Pedro, Calif. Pleistocene. Santa Barbara, Calif. Type locality, Deadman Island, San Pedro (fossil).
Dr. W.P. Woodring comments on this species (Per. Comm. Sept. 1945) " I agree with you that the abundant Pleistocene species of Bittium in the San Pedro district are rugatum and armillatum. I think ornatissimum is a synonym of armillatum."
Whether or not ornatissimum is a synonym of armillatum I have heard of no one claiming to have Recent specimens. Therefore we propose to drop it from our faunal list unless further advised.

Bittium munitum Carpenter, 1864. Forrester Island, Alaska (G. Willett) south to Cambria Pines, Calif, (Burch). Type locality, Neah Bay, Wash.
Collecting data: Forrester Island, Alaska (Willett); Cambria Pines, Calif. (Burch).
Bittium munitum munitoide Bartsch,1911. San Pedro, Calif. to San Geronimo Island, (Lowe). Reported from San Pedro (Oldroyd).

Bittium asperum Gabb,1861. Redondo Beach, Calif. (Burch) south to Ballenas Bay (Eric Jordan). Type locality: Post-Pliocene marl, Santa Barbara, on advice of Dr. A.M. Keen. Dr. W.P. Woodring states (Per. Comm. Sept. 1945) " The type locality of B. asperum is Santa Barbara, Pleistocene (of my terminology, Pliocene of others; Gabb called it Miocene.)"

Collecting data: Dredged off Redondo Beach in 50 fms.; off Malaga Cove in 15 fms.; Pleistocene of Hilltop Quarry (Burch);

* Note* Mrs. Oldroyd seems not to have copied the original description of Bittium asperum. I have no copy of Gabb. When we get it we will run it for the convenience of members.

Bittium asperum lomaense Bartsch,1911. Catalina Island to San Benito Island (Lowe). Type locality, 71-75 fathoms off Point Loma Light, San Diego.

Collecting data: San Benito Island in 10 fms. (Lowe); Catalina Island in 50 fms. (Lowe); South Coronado Island and San Diego (Baker) (San Diego Museum).

Bittium larum Bartsch,1911. Santa Monica, Calif. (Burch) south to San Bartholome Bay, L.C. Type locality, San Pedro, Calif.

Collecting data: An easily recognized species dredged common off Santa Monica, Redondo Beach, and San Pedro, Calif. in from 25 to 50 fathoms. It is usually associated with gravel or rocks. Dredged off Ensenada, Mex. in Todos Santos Bay in 50 fms.; Pleistocene of Hilltop Quarry, San Pedro (Burch);

Insertae Sedis

Bittium oldroydae Bartsch,1911. Destruction Island, Washington to Lower Calif. Type locality, Lower Calif. in drift.

This species is usually spelled oldroydi. Dr. A.M. Keen advises " B. oldroydi should be emended to Bittium oldroydae , as it was named for Mrs. Oldroyd."

Collecting data: San Diego (Kelsey); San Pedro (Lowe).

Bittium fetellum Bartsch,1911. Off Catalina Island in 16 fathoms.

Bittium giganteum Bartsch,1911. Pleistocene of San Pedro and San Diego, Calif.

If there are any Recent records of this species we would like to hear of them. Our opinion at this time is that this is found only fossil.

Bittium tumidum Bartsch,1907. Monterey to San Pedro (Oldroyd). Type locality, Monterey.

None of the members reported on this species. I do not know it. It was omitted from Bull. 112 and also from Keen's " Abridged Check List".

Genus Potamides Brongniart,1810. Type (by monotypy), P. lamarckii Brongniart. Fide Pilsbry.

" Shell turriculated, whorls angulated and coronated; aperture prolonged in front into a nearly straight canal; outer lip thin, sinuous; epidermis thick, olive brown. Operculum many-whorled." (Tryon).

Subgenus Pirenella Gray,1847. Type (by original designation), Cerithium mammillatum Philippi.

Potamides cyclus Dall,1919. Long Beach, Calif. to Gulf of Calif. Type locality, Laguna Beach, Calif.

(con.)

Dr. A. Myra Keen calls attention to a problem in connection with this species. Vertagus lordii Yates, Santa Barbara Soc. Nat. Hist. Bull. no.2, p.47,pl.2,figs.6,7, August,1890. Grant and Gale, p. 758 make the following statement " Clava ? lordii (Yates) , a form described from a single beach worn specimen retainibg only the body whorl and part of the penultimate whorl, appears as figured to be somewhat like C. gemmata; but it has more numerous rows of nodules. It came from the Santa Barbara Channel near Ellwood Santa Barbara Co. It may have been a ballast shell or a fossil washed out on the beach. Potamides cyclus Dall may be a synonym of lordii." Dr. Keen comments on this as follows " Yates also described a Vertagus lordii ; one would have to see the holotype to make sure what this latter is, but I suspect Grant and Gale are correct. They also suggest (p. 758) that Potamides cyclus Dall is a synonym of Yate's species; I had come to the same conclusion before noticing their comment."

Subgenus Liocerithium Tryon,1887. Type (by monotypy) Cerithium incisum Sowerby = C. sculptum Sowerby.

Potamides sculptum Sowerby,1855. Santa Barbara Islands, Calif. to Panama and the Galapagos Islands. Type locality is unknown.

Genus Cerithidea Swainson,1840. Type (by designation of Pilsbry and Harbison,1933,), Melania lineolata Griffith and Pidgeon,1834 (not Strombus lineolatus Gray,1828) = Cerithium obtusum Lamarck,1822. Fide Bequaert, Johnsonia, no.5, p. 1.

" Shell turriculate, often decollate, with many convex whorls, strongly sculptured. Vertical ribs regularly spaced, either even or more or less cut into tubercles and stopping at the periphery of the body whorl:; in addition, weak vertical growth striae and, in the intervals between the ribs, fine spiral striae; base, below the periphery, often with coarse spiral grooves and ridges, cut by fine growth-striae. Aperture with the columellar margin nearly straight, ending below in a slightly produced, very shallow groove; lower half of outer lip somewhat projecting beyond the base of the columella; edge of outer lip thickened, particularly over the upper two thirds, smooth inside. In some cases the thickened lip is repeated several times during life, older shells showing a series of varices along the spire. Operculum corneous, subcircular, spiral, closely coiled about a central nucleus. Animal with an anterior snout and a subcircular foot, obtuse behind; eyes on the tentacles, some distance from the tips; siphon long or short, usually fringed." (Bequaert, Johnsonia 5)

south to Tepoca Bay(Lowe)
Cerithidea californica (Haldeman),1840. Baulinas Bay, Calif. south to San Ignacio Lagoon (Eric Jordan). Type locality,'California in brackish water' on advice of Dr. A.M. Keen. Dr. Joshua L. Baily Jr. writes "According to the late Judge Junius Henderson, the type locality of Cerithidea californica is the Gulf of California, which would put it far outside of the range you have given."

Collecting data: Perhaps the most abundant species in the entire faunal list, appearing in vast numbers on almost all mud flats along the southern California coast. (Burch). San Quintin Bay, San Martin Island, Tepoca Bay, Sonora (Lowe) ; Tomales Bay, Marin Co., Calif. (Abbott). T

The set in the Lowe Collection in the San Diego Museum from Tepoca Bay, Sonora takes the range into the Gulf of California.

Cerithidea californica hyporhyssa (Berry),1906. Nautilus, vol.19,p.132. Type locality, San Diego.

This variety is generally ignored and placed in the synonymy. However,

(con.)

it is a smooth form and I have collected several thousands of them from San Diego Bayand they seem to be at least a different race of the species. I have never seen the same thing from any other locality, and am personally disposed to think it may be worthy of the subspecific name. However, I think that other members of the club have advised me that they have taken the smooth form elsewhere. But in any event they are definitely not worn smooth. They are simply different. We have been discussing distinct species that differ less from others than this does in my opinion. (Burch).
San Diego Bay- south of Coronado and south of National City (Junius Henderson (San Diego Museum).

Family Trichotropidae

Genus Trichotropis Broderip and Sowerby,1829. Type (by subsequent designation Hermannsenn,1849), Turbo bicarinata Sowerby.

" The shell may be characterized as being turbinated, and carinated externally; its aperture is wide, but still longitudinal, and it is rather longer than the spire; its base is entire, without any notch, although immediately below the obliquely truncated base of the columella there is an indistinct canal. The whole shell is thin and delicate, its outer lip particularly so. Epidermis horny, forming numerous sharp-pointed bristle-like processes on the edges of the carinae outside the shell; very strong and by its contraction in drying frequently breaking the edge of the lip. Operculum horny, much smaller than the aperture, composed of elliptical laminae its apex or nucleus lateral." (Sowerby).

Dr. Joshua L. Baily Jr. comments on this family (Per. Comm.) " I notice that Tryon, in the Manual of Conchology, places Trichotropis between the Janthinidae and the Scalaridae, while Cooke, in the Cambridge Natural History, places it between the Lamellariidae and the Naticidae. I wonder why."

Subgenus Trichotropis s.s.

Trichotropis bicarinata (Sowerby),1825. Shantar Islands, and on the east to Nunivak Island, Bering Sea. (Dall). Type locality, Newfoundland.

Collecting data: Punuk Island, Bering Sea in 15 fms. (Lewis)(Willett). .

Trichotropis conica Moller,1842, Forrester Island, Alaska; also Greenland . Type locality, Greenland.

Trichotropis borealis (Sowerby),1829. (T. costellata Couthouy,1838) in syn. The original description of this species is not in Oldroyd. Dr. A. Myra Keen has sent us the following data:

T. borealis: Type loc.: Northern Ocean, near Melville Island.
Original description (Zool. Journal, vol.4, p. 375) " T. testa suboblonga anfractibus quatuor rotundatis, subcancellatis, ultimo carinis tribus vel quatuor setosis; long. 1/10, lat. 11/20 poll." " Shell of a rather oblong form, with from 3 to 4 volutions, which are somewhat rounded, but furnished with 3 or 4 not very prominent, obtuse, keels, with smaller intervening striae, which are decussated by the lines of growth. The columella and the canal immediately below it are rather more lengthened than in the last species; the umbilicus is also rather more expanded, and consequently not so linear as in T. bicarinata ; on its edge as well as on the keels of the outside of the shell, the epidermis is produced into numerous bristle-like appendages.."

Range:- 54-72. Arctic Seas, Bering Sea, the Aleutian Islands and south to the Queen Charlotte Islands, British Columbia; (Dall).

Collecting data: Cape Lisbourne, Arctic Ocean in 30 fms.; Frederick Sound in 15 fms.; Montague Island, Pr. Wm. Sound in 18 fms.; Galena Bay, Pr. Wm. Sound in 15 fms.; (Lewis) (Willett)- have a set labelled costellata from 12 fms. off Hinchinbrook Island, Alaska collected by I. Norberg (Eyerdam)

Trichotropis cancellata (Hinds), 1843. Southern part of Bering Sea, and south to Oregon. Type locality, deep water Massachusetts Bay.

Collecting data: Montagu Island, Pr. Wm. Sound in 18 fms.; Humpback B. near Wrangell in 15 fms.; Vjenite Pass in 6-10 fms. ; Victoria, B.C. (Lewis) (Willett); dredged in Puget Sound off Friday Harbor (T. Kincaid); Orcas Island, Puget Sound (Dr. Baker); Port Blakeley, P.S. (Lowe)(San Diego Mus.)

Trichotropis insignis Middendorff, 1849. From Bering Strait south, on the west to Northern Japan, and on the east to the Aleutian Islands and Cooks Inlet, Alaska. (Dall). Type locality, Bering Sea.

Collecting data: Punuk Island, Bering Sea in 15 fms.; Terror Bay, Kodiak Island (Lewis) (Willett); Dutch Harbor, Aleutians (W.J. Eyerdam); Drier Bay, Knight Island (Eyerdam); Kodiak, Alaska (Lowe).

Subgenus Iphinoe H. & A. Adams, 1854. Type (by subsequent desig. Cossmann, 1906), Trichotropis unicarinata Sowerby.

" Shell thin; aperture subtrigonal; axis widely and deeply perforated."

Trichotropis coronata Gould, 1860, Arctic Ocean and Bering Sea. Type locality, Straits of Semiavine, Arctic Ocean in 20 fathoms.

Collecting data: Cape Lisbourne, Arctic Ocean in 30 fms. (Lewis)(Willett

Trichotropis kroyeri Philippi, 1848. Arctic and Bering Seas, eastward to Shumagin Islands, Type locality, ? Spitzbergen.

Trichotropis kelseyi Dall, 1905. Off San Diego, Calif. and Point San Quentin L.C. Type locality, off San Diego in 359 fathoms.

Subgenus Provana Dall, 1918. Type (by monotypy); T. (P.) lomana. Subgenus not otherwise diagnosed. (Advice of Dr. A.M. Keen).

Trichotropis lomana Dall, 1918. Off Point Loma, San Diego Co., Calif. in 650 fathoms.

Family Caecidae

The following keys and list of species are from Mr. A.M. Strong's note-book. We will then take up a detailed discussion of the species reported north of San Diego.

Family Caecidae

Sculpture faint or absent .... Fartulum
Sculpture present
. With raised longitudinal ridges or angulations only.... Elephantulum
. Sculpture not confined to longitudinal ribs
.. With circular rings, longitudinal sculpture absent
... Rings strong and distantly spaces, less than 3.5 mm. long.. Caecum
... Rings slender and closely spaced, more than 3.5 mm long .. Micranellum
.. With both longitudinal ribs and raised rings ....Elephantanellum

Surface smooth or with microscopic striae only ....Fartulum
Surface sculptured with fine raised rings only .... Micranellum
Surface sculptured with strong raised rings only .... Caecum
Surface with longitudinal ridges or sharp angles only.... Elephantulum
Surface with longitudinal ridges and raised rings .... Elephantanellum

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Genus Fartulum

Surface entirely smooth
. Plug with a triangular point or lateral spur
.. Plug pointed toward concave side of tube.. Mazatlan..... reversum Carp.
.. Plug pointed toward convex side of tube
... Tube nearly straight
.... Tube light brown or white San Pedro to Pt. Abreojos ...hemphilli Bartsch
.... Tube dark brown, smaller San Pedro to Lower Calif. ... bakeri Bartsch
... Tube strongly curved Mazatlan-Panama .... laeve C.B. Adams
.. Plug rounded or with a rounded knob
... Plug hemispherical
.... Tube stout, less than 2 mm. in length Mazatlan .... glabriforme Carp.
.... Tube slender, more than 3 mm. in length San Pedro to Lower Calif... .. occidentale Bartsch
... Plug not hemispherical
.... Aperture somewhat angulated Mazatlan ....teres Carpenter
.... Aperture not angulated
..... Aperture oval San Pedro to Lower Calif. .... orcutti Dall
..... Aperture circular Mazatlan ....dextroversum Carp.
Surface not entirely smooth
. Surface with microscopic concentric wrinkles Mazatlan .. corrugulatum Cpr.
. With a few faint rings near the aperture Mazatlan .... farcimen Carp.

Genus Fartulum

Surface smooth except for microscopic lines of growth
. Section slightly laterally compressed, aperture contracted
2.1 x 0.7 mm. San Pedro to Lower Calif. .... orcutti
Wash. Ac. 10-566; Oldroyd 2-2-47
. Section subangulated, aperture contracted, then reflexed
2.9 x 0.7 mm Mazatlan .... teres
Mazatlan Catalogue no. 378
. Section circular
.. Plug hemispherical, without a claw
... Shell large for the genus
3.1 x 0.9 mm. San Pedro to Lower Calif. .... occidentale
Wash. Ac. 10-566
... Shell much smaller
1.8 x 0.4 mm. Mazatlan .... glabriforme
Mazatlan Catalogue no. 374
.. Plug triangular or with a lateral spur
... Tube nearly straight
.... Light brown to white
3.i x 0.7 mm. San Pedro to Lower Calif. .... hemphilli
Wash. Ac. 10-566
.... Dark Brown, smaller
2.5 x 0.6 mm. San Pedro to Lower Calif. .... bakeri
Wash. Ac. 10-566
... Tube strongly curved
.... Horn colored, sometimes with brown marks
1.5 x 0.5 mm. Mazatlan- Panama .... laeve
Mazatlan Catalogue no. 372
.. Plug with a central raised knob
... Tube tapering
2.5 x 0.6mm. Mazatlan .... dextroversum
Mazatlan Catalogue no. 376
.. Plug with the point at the front
1.2 x 0.3 (young) Mazatlan .... reversum
Mazatlan Catalogue no. 377

Surface with microscopic concentric wrinkles
1.9 x 0.4 mm. Mazatlan .... corrugulatum
Mazatlan Catalogue no. 375
Surface with a few faint rings near the aperture
1.6 x o.5 mm. Mazatlan .... farcimen
Mazatlan Cat. no. 373

Genus Micranellum
Plug with an attenuated , oblique spur
• Anterior portion of adult shell bulbously expanded
•• Rings about 75 on adult segment
••• Shell robust
4.5 x 1.3 mm. off Santa Rosa and Catalina Islands .... catalinense
Jr. Wash. Acad. Sci. 10:568
••• Shell slender
5.5 x 1.3 mm. off San Diego .... profundicolum
Jr. Wash. Acad. Sci. 10:568
•• Rings about 100 on adult segment
5.3 x 1.5 mm. San Pedro to San Diego............ pedroense
Jr. Wash. Acad. Sci. 10:569
•• Rings very numerous
2.9 x 0.4 mm. Mazatlan .... subimpressum
Mazatlan Cat. no. 367
• Anterior portion of adult shell not bulbously expanded .
•• Shell robust
••• 6.2 x 1.6 mm. Barkley Sound .... barkleyense
Jr. Wash. Acas. Sci. 10:568
•• Shell slender
4.6 x 1.2 mm. Forrester Island to Monterey .... oregonense
Jr. Wash. Aoad. Sci. 10:568
Plug with a spreading base and triangular point
• Rings comparatively distant
6.9 x 1.2 mm. Off Santa Rosa Island .... rosanum
Jr. Wash. Acad. Sci. 10:568
• Rings fine and close
6.2 x 1.3 mm. Monterey to Lower Calif. .... crebricinctum
• 50 low rings lohri S. & H.
• Rings rounded scarcely rising
2.8 x 0.6 mm. Mazatlan .... elongatum
Mazatlan Catalogue no. 366

Genus Caecum
Shell robust
• About 40 strong rings on adult segment
2.8 x 0.8 mm. Monterey to Lower California .... californicum
• About 30 flattened, squarish rings
2.5 x 0.6 mm. Mazatlan-Panama .... firmatum
• About 20 rings with wide interspaces
2.3 x 0.7 mm. off San Diego .... grippi
Jr. Wash. Ac. Sci. vol. 10:566
• About 15 rings with narrow interspaces
2.5 x 0.7 mm. San Diego to Lower California .... dalli
Jr. Wash. Acad. Sci. 10:568
• Very distant, bar-like, sharp rings
2.55 x 0.75 mm. Mazatlan .... clathratum
Maz. Cat. no. 369

(con.)

Shell slender
- About 20 narrow, slender rings
  2.0 x 0.4 mm San Diego .... diegensis
- About 18 broad rings
  2.2 x 0.5 mm Monterey to San Diego .... licalum
- About 15 rings on adult segment, young segments smooth
  1.85 x 0.5 mm Mazatlan-Panama .... parvum C.B. Adams

Genus Elephantulum

About 20 ridges separated by shallow grooves
2.75 x 0.7 mm. Panama .... laqueatum
Panama Shells no. 215

Ridges strong, squarish, separated by deep grooves
3.3 x 0.7 mm. Mazatlan .... insculptum
Maz. Cat. no. 360

Scupture of fine ridges and striae
- Plug rounded, with an obtuse point
  3.3 x 0.65 mm. Mazatlan .... obtusum
  Maz. Cat. no. 363
- Plug flat, with a small subspiral knob
  3.9 x 0.75 mm. Mazatlan .... subspirale
  Maz. Cat. no. 361

Genus Elephantanellum

About 7 strong, angular ridges crossed by strong rings
? x 0.4 mm. Mazatlan .... heptagonum
Maz. Cat. no. 365

Ribs variable but riding over the fine rings
3.5 x 0.8 mm. Mazatlan .... liratocinctum
Maz. Cat. no. 364

About 30 fine ridges, rings fine except terminal one
1.5 x 0.6 mm. Mazatlan .... abnormale
Maz. Cat. no. 362

Ridges fine, rings strong near the aperture
4.8 x 0.9 mm. San Pedro to Lower Calif. .... carpenteri
Jr. Wash. Ac. Sci. 10:567

Genus Fartulum

Fartulum orcutti Dall	San Pedro to Mazatlan
Fartulum occidentale Bartsch	Puget Sound to Lower Calif.
Fartulum hemphilli Bartsch	San Pedro tp Point Abreojos
Fartulum bakeri Bartsch	Alaska to Gulf of Calif.
Fartulum teres Carpenter	Mazatlan
Fartulum glabriforme Carpenter	Mazatlan
Fartulum dextroversum Carpenter	Mazatlan
Fartulum reversum Carpenter	Mazatlan
Fartulum corrugulatum Carpenter	Mazatlan
Fartulum farcimen Carpenter	Mazatlan
Fartulum laeve C.B. Adams	Mazatlan to Panama

Genus Caecum Fleming, 1817.

Caecum bahiahondaense Strong & Hertlein	Bahia Honda, Panama
Caecum californicum Dall	Monterey to Lower Calif.
Caecum clathratum Carpenter	Mazatlan to Panama
Caecum dalli Bartsch	San Pedro to Lower Calif.
Caecum diegensis Bartsch	San Diego

(con.)

Caecum firmatum C.B. Adams	Mazatlan to Panama
Caecum grippi Bartsch	San Diego
Caecum licalum Bartsch	Monterey to San Diego
Caecum parvum C.B. Adams	Mazatlan to Panama
Caecum richthofeni Strong & Hertlein	Taboga Island, Panama

Genus Micranellum Bartsch,1920

Micranellum catalinense Bartsch	Santa Rosa and Catalina Island
Micranellum crebricinctum Carpenter	Monterey to San Martin Island
Micranellum lohri Strong and Hertlein	Taboga Island, Panama
Micranellum elongatum Carpenter	Mazatlan
Micranellum pedroensis Bartsch	San Pedro to Panama
Micranellum profundicolum Bartsch	San Diego
Micranellum rosenus Bartsch	Santa Rosa Island
Micranellum subimpressum Carpenter	Mazatlan

Genus Elephantulum Carpenter,1858

Elephantulum insculptum Carpenter	Mazatlan
Elephantulum laqueatum C.B. Adams	Panama
Elephantulum obtusum Carpenter	Mazatlan
Elephantulum subspirale Carpenter	Mazatlan

Genus Elephantanellum Carpenter

Elephantanellum abnormale Carpenter	Mazatlan
Elephantanellum carpenteri Bartsch	San Pedro to Point Abreojos
Elephantanellum heptagonum Carpenter	Gulf of Calif. to Panama
Elephantanellum liratocinctum Carpenter	Gulf of Calif. to Panama

Family Caecidae

The most important reference on this group is Bartsch, Paul in Journ. Wash. Acad. Sci. vol. 10, 1920. There is another key to genera and species.

Genus Caecum Fleming,1813. Brewster's Edinburgh Encyclopedia, vol.7, p.67. (Quoted from Sherborn, Index Animal, 1801-50, pt. 5, p. 950). Am. Ed. vol. 6, pt. 2, p. 689, 1815.

Type (by subsequent designation, Gray,1847, Proc. Zool. Soc. London, pt. 15, 203)- Dentalium trachaea Montagu. (Fide Woodring,1928).

" Shell tubular. Nucleus consisting of several whorls coiled in one plane and of a short curved tube, separated by a septum from the next stage, which is a curved tube, which in turn is separated by a conical pointed septum or plug from the adult shell. Both of these stages generally are detached from the adult shell, which consists of a tube curved in same plane as coil of nuclear whorls. Aperture circular. Adult shell smooth, or variously sculptured, generally with annular tings." (Woodring).

Caecum californicum Dall,1885. Monterey, Calif. to Lower Calif.
Type locality, San Diego.

Collecting data: Pt. Vicente, Balboa, San Pedro, Bird Rock, San Onofre, and Punta Banda, L.C.; have dredged sets from off Coronados Islands by Dr. F. Baker and sets from Pt. Abreojos and La Paz. (Burch); San Martin Island, (Baker); San Diego Bay (Kelsey and Baker); San Pedro and Pt. Abreojos (Lowe); Ocean Beach (Baker) (San Diego Museum).

Caecum dalli Bartsch,1920. Point Vicente, Calif. to Lower Calif.
Type locality, San Diego, Calif.

Collecting data: Pointe Vicente, Calif. (Strong); San Martin Island and So. Coronado Id. (Baker); San Pedro (Lowe).

Caecum licalum Bartsch,1920. Monterey to San Martín Island (Baker). Type locality, San Diego.
Collecting data: Dredged off Avalon, Catalina Island in 35 fms. (Burch); So. Coronado Island in 7 to 14 fms. (Baker); San Martin Island, L.C. (Baker) Laguna, Calif. in 10 fms. and Reef Pt. (Strong); Pt. Vicente (Lowe).

Caecum diegense Bartsch,1920. San Diego, Calif. to Conception Bay,L.C.(Bancroft). Type locality, San Diego.
Collecting data: Conception Bay (Bancrodt); So. Coronado Island in 3 to 8 fms. (Baker).

Catalina Island (Lowe) south to
Caecum grippi Bartsch,1920. Off San Diego, 15 to 20 fathoms south to Coronado Islands, L.C. (Baker). Type locality, off San Diego
Collecting data: So Coronado Island in 3 to 14 fms. (Baker); No. Coronado Island (Baker); Catalina Island in 35 fms. (Lowe) (San Diego Museum) .

* Note* The only descriptions of species of Caecidae described in 1920 by Bartsch are in the discussions of genera which Mrs. Oldroyd did not reprint.

Genus Micranellum Bartsch,1920. Type (by original designation), Caecum crebricinctum Carpenter.
" Surface of the shell marked by closely spaced, slender, axial annulations; operculum thin, corneous, Concave." (Bartsch).

Micranellum crebricinctum (Carpenter),1864. Forrester Island, Alaska south to San Martin Island, L.C. (Baker). Type locality, San Diego, Calif.
Collecting data: Dredged in abundance off Monterey in 20 to 40 fms.; off Pacific Grove in 15 fms.; very abundant off Redondo Beach in 15 to 25 fms.; off Malaga Cove in 15 fms.; Newport Bay; 5 miles off El Segundo, Calif. in 35 fms. (Burch); So. Coronado Island in 7 to 14 fms. (Baker); San Diego Bay (Orcutt); San Pedro in 12 fms. (Lowe); Bird Rock (Bristol).

Micranellum pedroense Bartsch,1920. San Pedro to San Diego, Calif. Type locality, San Pedro.
Mr. George Willett in Transactions of San Diego Soc. of Nat. Hist. vol.8, no.30,1937- quoting as follows " It appears to the writer that M. pedroense Bartsch and Caecum magnum Stearns as figured by Arnold, are the young of M. crebricinctum (Carpenter). This species, during juvenility, is slender, rather strongly curved, and the plug is longer and narrower; as it becomes o older, the slender part of the shell is discarded; some of the curve being l lost, and the plug becomes thicker and more blunt."

Micranellum catalinense Bartsch,1920. Santa Rosa and Catalina Islands in 50 fms. Type locality, off Santa Rosa Island, Calif.
Collecting data: Dredged off Catalina Island in 35 fms. (Burch); Catalina Island in 35 fms. (Lowe).

Micranellum profundicolum Bartsch,1920. Off San Diego in 55 to 199 fathoms.

Micranellum oregonense Bartsch,1920. Prince William Sound, Alaska to San Diego. Type locality, Forrester Island, Alaska.
Collecting data: Forrester Island, Alaska (Willett); Queen Charlotte Island (Lowe); Drier Bay, Knight Island, Alaska (Eyerdam).

Micranellum barkleyense Bartsch,1920. Barkley Sound, Vancouver Island.
Micranellum rosanum Bartsch,1920. Off Santa Rosa Island in 48 fathoms.

Genus Fartulum Carpenter,1856. Type (by subsequent designation, Bartsch 1920),: Caecum laeve C.B. Adams.

" C. t. laevi, cylindracea, saepius utrinque contracta; apertura saepe declivi" (Carpenter). " Shell smooth, excepting microscopic incremental lines."

Fartulum orcutti Dall,1885. San Pedro to Mazatlan, Mexico.
Type locality, San Diego, Calif.

Collecting data: Malaga Cove, L.A. Co., Calif. among stones near high tide mark; quantities of dead eel grass and other algae among the stones. They are in our experience usually found in similar habitat. They are so exceedingly abundant that it was possible (in August) to simply shake them out of the algae and quickly collect perhaps half a gallon of the pure Fartulum. To count them would require a lifetime. We took the same species in about the same kind of place at San Onofre, Calif. and along the rocks north of Ensenada, Mexico. (Burch); South Coronado Island (Baker); San Diego (Baker and Kelsey)(Orcutt); La Jolla (Chaney); Catalina Island (Strong); San Martin Island (Baker); San Pedro (Lowe); Todos Santos Bay (Orcutt) (San Diego Museum).

and Gulf of Calif.

Fartulum hemphilli Bartsch,1920. San Pedro, Calif. to Point Abreojos,L.C.
Type locality, San Pedro, Calif.

Collecting data: Point Abreojos (Hemphill); San Felipe (Stephens); San Martin Island (Baker); So. Coronado Island in 3 to 9 fms. (Baker); La Jolla (F. Stephens).

Fartulum occidentale Bartsch,1920. Prince William Sound (Eyerdam). south to Lower Calif. Type locality, San Pedro, Calif.

Collecting data: South Coronado Island in 14 fms. (Baker); Scammons Lagoon (Huey); San Martin Island (Baker); San Diego (Baker); Conception Bay (Bancroft); Pleistocene of Hilltop Quarry, San Pedro (Burch).

Fartulum bakeri Bartsch,1920. Ellamar, Alaska to Mazatlan,Mexico.
Type locality, San Pedro, Calif.

Collecting data: San Pedro, Calif. and El Morro Point, 6 miles north of Ensenada,Mexico. (Burch); South Coronado Island in 7 to 16 fms. (Baker); San Diego (Baker); Bird Rock (Baker); La Jolla (F. Stephens); San Pedro ((Lowe); Point Vicente (Strong); La Jolla (Simmons);

Genus Elephantanellum Bartsch,1921. Type (by original designation) E. hexagonum (Carpenter).

Dr. A. Myra Keen advises " Elephantulum Carpenter,1856 is not represented in our fauna, apparently. Note that Bartsch proposes a new genus, Elephantanellum with type E. hexagonum (Carpenter). The type of Elephantulum is Caecum abnormale Carpenter. Mrs. Oldroyd copied Bartsch's description of Elephantanellum under the heading of Elephantulum."

" Surface of shell marked by raised ridges, which coincide with the long axis of the shell; annulations strongly developed; operculum thin, corneous, concave." (Bartsch).

Elephantanellum carpenteri (Bartsch),1920. San Pedro, Calif. to Gulf of Calif. Type locality, San Diego, Calif.

Collecting data: San Felipe, L.C. (F. Stephens); Conception Bay (Bancroft) (San Diego Museum).

Family Vermetidae

Tryon's Manual of Conchology has the following arrangement:

Shell with internal laminae ....Genus Vermetus
• With laminae on parietal wall ....Subgenus Vermetus
• With 2 ridges on columella becoming obsolete near
apex and aperture ....Subgenus Petaloconchus
• With internal laminae very strong on middle section. Subgenus Macrophragma
• With a faint median thread on the columella .... Subgenus Aletes
Shell without internal laminae
• Shell attached
•• Tube with a elevated median line .... Genus Bivonia
•• Tube with 3-5 longitudinal lirae .... Genus Thylacodes
•• Tube irregularly twisted and carinated .... Genus Siphonium
•• Shell spiral, aperture slightly inflexed .... Genus Stephopoma
• Shell in a groove excavated by the animal ....Genus Spiroglyphis
• Shell free ....Genus Vermicularia

Genus Bivonia Gray,1847. Type (by monotypy), Vermetus glomeratus Bivona-Bernardi.

" Shell affixed, mostly spiral, aperture contracted, circular, with spiral,interruptedly nodulose lirae, and a median elevated line; columella smooth. Operculum small, rudimentary? (Tryon).

Bivonia compacta Carpenter,1864. Vancouver Island, to Gulf of Calif. Maxwell Smith in Panamic Marine Shells gives the range south to Payta,Peru. Type locality, Vancouver Island. " Barclay Sound on Pachypoma".

Mr. A.M. Strong makes the comments on the species:" Carpenter says belongs to Bivonia Gray (not Morch). Has the aspect of Petaloconchus macrophagma on a large scale, but is entirely destitute of internal laminae. One specimen had a faint columellat thread for two whorls only.

Tryon retains the species in Bivonia of Morch tho the description makes no mention of the median elevated line. No description of Bivonia Gray found."

Collecting data: Dredged off Monterey, Calif. on shale bottom; off Redondo Beach in 50 fms. gravel and shale; off San Pedro, Calif. in 20 fms. (Burch); San Felipe, L.C. (F. Stephens); Magdalena Bay " cf compacta" (Baker) (San Diego Museum).

Genus Vermicularia Lamarck,1799. Type (by monotypy), Serpula lumbricalis Linnaeus.

" Shell free, in its early stage regularly coiled like a Turritella; subsequently uncoiled, the tube variously twisted, or more or less straight and prolonged. Operculum size of the aperture." Tryon.

Vermicularia eburnea (Reeve),1842. West Coast, North, South and Central America; San Pedro, Calif. to Panama. Type locality, South America (fide Oldroyd).

Dr. A. Myra Keen in Abridged Check List gave the species fewkesi, and has advised us as follows about that " Vermiculus fewkesi Yates (Bull. Santa Barbara Soc. Nat. Hist. vol. 1, no. 2, p. 48, pl.2, figs. 8-9) is very probably a synonym of Vermicularia eburnea (Reeve),as Grantand Gale suggest. I included it in the Check List because I thought at that time there might be morphologic differences between the northernand southern forms."

The following notes re this species appear in Mr. Strongs notebook " In Maz. Cat. Carpenter says " This description (of V. pellucidus) will suit the young of V. eburneus but is not sufficiently explicit for certainty."

(con.)

Carpenter states that *Vermetus glomeratus* C.B. Adams (not Lam.) is in part this species.
Tryon gives the species under *V. pellucidus* B. & S. If the two are the same this has priority."

Collecting data: Pta. Libertad, Sonora (Lowe); Taboga Island (Lowe); Mazatlan; Manzanillo; Acapulco; La Paz; Magdalena Bay; Tepoca Bay and Pts. Penasco; Montijo Bay, R.P. (Lowe) (San Diego Museum). Lowe also labeled a set from Cedros Island and another from Long Beach with the name *fewkesi*.

Mr. Strong lists the following two species from the south.
Vermicularia pellucida Broderip and Sowerby,1829. Central America
Vermicularia hindsii Gray : Lower Calif. to Tehuantepec

Genus *Aletes* Carpenter,1856. Mazatlan Catalogue, p. 301, August,1856) Type (by subsequent designation Vossmann,1912), *Vwrmetus centiquadratus* Valenciennes. Grant and Gale in citing *Aletes* from the Proc. Zool. Soc. for 1856 did not realize that this part of the volume (p.226) was not published until January,1857. The above data on advice of Dr. A.M. Keen.

" Shell spirally twisted, attached, surface often decussated, columbella with a faint median threadlike line."

Aletes squamigerus Carpenter,1856. Forrester Island, Alaska to Payta,Peru and the Galapagos. Type locality, Santa Barbara, Calif.

Mr. Strong makes the following comments in his notebook. " Carpenter in Supl. Report says a *Serpulorbis* not *Aletes*. Morch places it in *Thyacodes* as does Tryon. Neither recognize *Serpulorbis*. Why Dall returns it to *Aletes* is not stated. No mention is made in the description of internal armature which Tryon uses to define *Aletes*. Morch gives var. *pennata* equals *margaritarum* Val. of which Carpenter says " Affiliated to the California shell on supposititious evidence and probably distinct. These appear to be from the tropical fauna." Oldroyd's Puget Sound Shells gives variety *pernatus* Morch. Probably a misspelling and misidentification."

Collecting data: Our common worm tube needs no locality records. The bathymetric range is not great although we have dredged it off Monterey on the shale as deep as perhaps 20 fathoms so it is not strictly littoral. (Burch),

Aletes squamigerus ponnatus (Morch),1860. Jour. Conchyl., vol.8 (ser.4, vol.4), p. 43. Type locality: Realejo and north of Bocorones Is.
Original description: " Coquille épaisse, fixée au coté droit, irregulierement contournee en spirale, comme coudee, avec deux carenes aplaties et rapprochees; stries d'accroissement ca et la en lamelles rudes; ombilic ouvert quadrangulairement. L'Opercule un peu concave, se compose d'elements concentriques .. Le dessus de l'operculo est pourvu de poils en rayons irreguliers ..."

Grant and Gale list this subspecies and state living West Mexico to Panama with ? . T.S. Oldroyd, Proc. U.S.N.M. vol. 65, art.22, p. 16,1925 states " Living, San Pedro, Calif.and north".

Grant and Gale state " This variety lacks the rough longitudinal striations of the typical form.".

Collecting data: We have taken specimens from the Pleistocene of Hilltop Quarry, San Pedro which we have so labelled but have never recognized it living.

Aletes centiquadratus(Valenciennes)1846. San Diego, Calif. to Panama. Type locality, Gulf of Calif.

(con.)

Mr. A.M. Strong makes the following notations on this species:
" Carpenter in Mazatlan Cat. No. 252 described the shell figured on the plates of the Voyage of the Venus and says that Vermetus peronii Val. on the same plate is a variety.

Morch places it under Aletes and gives V. effusus Val. as the same specimen/ Also gives variety maxima equals V. panamensis Chen of C.B. Adams Also a variety equals V. peronii Val. (Which Carpenter questions in Suppl. Report) and a variety bridgesii from Panama.

Carpenter in notes on Adams shells gives V. panamensis as equals Aletes centiquadratus of Maz. Cat.

Carpenter adds as a questionable variety A. imbricatus in Maz. Cat. "
Coll. Data: Manzanillo,Magdalena Bay,Kino Bay,Puntarenas,C.R. (Lowe).

Genus Spiroglyphus Daudin,1800. Type, Spiroglyphus annulatus Daudin

" Animal excavating a groove on the surface of shells or stones, covering it over with shelly material,and thus forming a tubular planorbiform case. When first hatched, the shell is spiral and regular, consisting of one and a half whorls; it soon attaches itself, the channel it excavates being at first shallow, afterward deeper; color bright purple to nearly black. The operculum is large , thick, convex exteriorly, with strong concentric laminae, plane interiorly, concentrically lirate, with central mamilla, and narrowly elevated margin." (Tryon, Manual of Conchology).

Spiroglyphus lituellus Morch,1861. Forrester Island, Alaska to San Diego, Calif. Dr. A.M. Keen advises " The type locality of Spiroglyphus lituellus is California, in young Haliotis splendens."

Collecting data: Morro Bay, Calif. from backs of Haliotis rufescens; dredged off Monterey, Calif. in 10-20 fms. on the shale (Burch); Catalina Island (Lowe) ; La Jolla (Baker) (San Diego Museum).

Genus Petaloconchus H.C. Lea,1843 Type (by monotypy), Petaloconchus sculpturatus Lea. Miocene, Virginia.

" Shell more or less regularly coiled in an open spire during part of growth,more or less straight during final stage. Early stage contorted by more regularly coiled. Aperture circular. Columellar wall bearing two relatively long thin lamellae that disappear near aperture and may be absent elsewhere. Sculpture consisting of spirally arranged crude pustules or of axial wrinkles." (Woodring, 1928, p. 347.)

Petaloconchus anellum (Morch),1861. Monterey, Calif. to San Hipolito Point, L.C. (Jordan). Type locality, California on Haliotis.

Dr. Dall listed this species in Bulletin 112 under genus Vermiculum Montagu,1803. Dr. A.M. Keen states " Vermiculum should be stricken from the list, as the genotype is a protozoan."

Collecting data: Dredged off Monterey, Calif. in 10-20 fms. on shale; Morro Bay on Haliotis rufescens; (Burch); San Pedro (Lowe); off So. Coronado Island in 18 fms. (Dr. F. Baker).

Petaloconchus macrophragma Carpenter,1857. Catalina Island to Panama. Type locality, Mazatlan.

Collecting data: Catalina Island, Calif. (Lowe)

Petaloconchus complicatus Dall,1908. Puget Sound to Panama
Type locality, near Cocos Island.

Collecting data: Dredged off Monterey, Calif. in 20 fms.; off Redondo Beach in 25 fms. gravel (Burch); Catalina Island (Lowe).

Petaloconchus montereyensis Dall,1919. Monterey, Calif. to Catalina Island Calif. Type locality, Monterey.

Collecting data: We were at one time disposed to think this a variety of complicatus, but after bringing up numbers of specimens fitting the description exactly from off Monterey on the shale in about 20 fms. we considered it a good species (Burch); Catalina Island and San Pedro, Calif. (Lowe).

Genus Thylacodes Guettard,1774.

Dr. Dall in Bull. 112 lists a species eruciformis Morch ,1861. Of this Dr. A.M. Keen states " The species of Thylacodes attributed to California by Morch seems to me to be a matter of erroneous locality, a s no such form has been reported in recent years." And Mr. A.M. Strong comments on it as follows " Dall lists a Thylacodes eruciformis Morch. This is probably a missprint for T. cruciformis Morch which is described with two varieties in P.Z.S. 1862, p.70. Morch gives California on Crucibulum ? umbrella and Margaritifera. Carpenter says " This species is on shells from the Mexican not the California fauna."

Mr. Strong lists the following species of the Genus Vermetus from the southern fauna.

Vermetus contortus Carpenter,1857. Gulf of Calif. to Panama
Vermetus albidus Carpenter,1857 Gulf of Calif.
Vermetus tripsycha Pilsbry and Lowe, 1932 Guaymas

Family Turritellidae

The following key and list of species is from Mr. A.M. String's notebook. We will then take up a discussion of our species reported north of San Diego.

Genus Turritella

Upper whorls with a sharp central keel
. Middle whorls flattened, lower whorls more or less concave
.. White, thickly marbled with gray or reddish black
115 x 25 mm. Gulf of Calif. to Peru .... goniostoma
. Central keel strong on all whorls
.. Ash-olive, mottled with blackand white
60 x 18 mm. Panama .... banksii
. Lower whorls closely, equally, spirally ridged
.. Light red
16 x 10 mm. West Columbia .... rubescens
Three equal spiral keels on all whorls
. Rusty white, keels chestnut-black
70 x 20 mm. Chile .... cingulata
Five to eight spiral keels on lower whorls- whorl overhanging
. Whitish, profusely painted with oblique purple streaks
85 x 22 mm. Gulf of California .... leucostoma (tigrina)
Many equal, close, flat, spiral cords
. Fulvous white, cords painted with squarish chestnut spots
85 x 22 mm. Gulf of California ....sanguinea
Two prominent spiral keels separated by a central concave area
. Central area equally spirally threaded
.. Keels smooth throughout
... Yellowish, with chestnut or chocolate longitudinal flames
60 x 13 mm. California .... cooperi
.. Keels finely beaded on lower whorls
... Pale pinkish brown
45 x 9 mm. California to Tres Marias .... mariana

.. Upper keel strongly nodulous
... Grayish white, with brown flames between nodes
52 x 15 mm. Gulf of Calif. to Central America .... nodulosa
. Central area with two smaller keels
.. Tinted reddish brown
45 x 11 mm. California .... jewetti
Double keel at top and bottom of a central area
. Whitish, variegated with reddish brown
80 x 15 mm. Guayaquil .... radula

Genus Turritella Lamarck,1799

Turritella cooperi Carpenter,1866	Monterey to Cerros Island
Turritella jewettii Carpenter,1864	Santa Barbara to Salina Cruz
Turritella mariana Dall,1908	Catalina to Panama
Turritella nodulosa King,1831	San Diego to Panama
Turritella leucostoma Val.1833 (tigrina)	Cerros Island to Panama
Turritella goniostoma Val. 1833	Lower Calif. to Peru
variety banksii Reeve,1849	
Turritella sanguinea Reeve,1849	Gulf of Calif.
Turritella rubescens Reeve,1849	Panama
Turritella cingulata Sowerby,1825	Ecuador to Chile
Turritella radula Kiener,1840	Ecuador

Genus Turritella Lamarck,1799. Type (by monotypy), Turbo terebra Linne .
" Shell slender, many-whorled, spire high, whorls more or less bulging or flat. Aperture broadly ovate. Outer lip of type species flexed backward near suture, then extending backward and more gently forward, forming a broad shallow asymmatric sihus. Other species have outer lips of different shape. Sculpture of type species consisting of heavy spiral threads between which lie very fine spiral threads. Some species have beaded spiral cords."(Woodring

Turritella nodulosa King,1831. San Diego, Calif. to Panama, to Ecuador(Lowe)
Collecting data: Acapulco in 20 fms. (Lowe); Manzanillo in 20 fms. (Lowe); Tenacatita Bay, Mex. in 35 fms. (Huffman); La Paz, L.C. (Lowe); Guaymas,Mex. and Taboga Island, Panama (Lowe); Ecuador (Lowe)

Turritella mariana Dall,1908. Catalina Island, Calif. to Panama Bay.
Type locality, near Tres Marias Islands,Mexico in 50 fms.
Collecting data: Ship Rock, Catalina Island in 40 fms. (Strong); Acapulco and Manzanillo in 20 fms. (Lowe); Long Beach, Calif. (Lowe); off Newport, Calif. (Tremper)(San Diego Museum).

Turritella pedroensis Applin,1941 (Turritella jewettii)
Dr. W.P. Woodring advises on this species as follows (Per. Comm.)
" Turritella jewettii of your list is now known as T. pedroensis Applin,1941 (in Merriam,C.W., Fossil Turritellas from the Pacific Coast Region of North America: Calif. Univ. Dept. Geol. Sci. Bull. vol.26, pp. 121-123, pl.35, figs 1-9). I am accepting pedroensis instead of Arnold's usage of jewettii since there is much doubt about jewettii , the type of which appears to be no longer extant." Dr. A. Myra Keen comments " Dr. Woodring's comments on Turritella jewettii and on Merriam's paper are not open to challenge."
Collecting data: If I understand this species correctly we have found it in considerable abundance in the Hilltop Quarry Pleistocene and also Timm's Point of San Pedro, Calif. , but have never recognized a Recent specimen." (Burch)
Dall gives the range Recent from Santa Barbara to Salina Cruz,Mexico.

Turritella cooperi Carpenter, 1864 Monterey, Calif. south to Cerros Island, Mexico (Baker). Type locality, San Pedro, Calif.

Collecting data: Off Monterey, Calif. in 50 fms.; off Avalon, Catalina Island in 25 fms.; off El Segundo, Calif. 5 miles out in 35 fms. rockand gravel; off Redondo Beach in 25 fms. gravel south side of submarine canyon; in 50 fms. on north side of canyon; off Ensenada, Mexico in 50 fms.; a very common fossil in the Pleistocene of Timm's Point, San Pedro (Burch); San Pedro (Hemphill); San Pedro in 10 fms. (Lowe); Cerros Island, L.C. in 14 to 30 fms. (Baker); Long Beach (Lowe) (San Diego Museum).

Genus Turritellopsis G.O. Sars, 1878. Type, Turritellopsis acicula Stimpson(by monotypy).

" Shell, like Turritella but the lingual dentation differs" (Tryon). "... the whorls of the spire grooved across; aperture oval; radula without marginal teeth. Inhabits boreal seas."

Turritellopsis acicula stimpsoni Dall, 1919. Nunivak Island, Alaska south to San Ignacio Lagoon, L.C. (Eric Jordan). Type locality, San Diego.

Collecting data: Dredged off San Juan Islands, Puget Sound by Trevor Kincaid, 1940 (Burch); Teller, Bering Sea; Kodiak Island, Alaska in 13 fms.; Montagu Island, Pr. Wm. Sound in 18 fms. (Lewis) (Willett).

Genus Tachyrhynchus Morch, 1868. Type (by subsequent designation Cossmann 1912): Turritella lactea Moller.

" Shell like a small Turritella, the whorls of the spire grooved across, and rounded; sculptured by spiral and longitudinal lines. Aperture oval, slightly produced in front into a rudimentary channel; lip sharp"

Identifications of specimens in this genus has been a mooted question with us for years. Grant and Gale state " This shell looks like some species of Bittium but it is supposed to have a multispiral operculum with central nucleus, whereas Bittium has a paucispiral operculum."

Reference to our discussion of Bittium subplanatum and Bittium catalinense dredged in vast numbers off Redondo Beach and Catalina Island in 50 to 150 fathoms mud bottom will give a clue here. Among this mass of Bittium we found specimens seeming to fit the description of Tachyrgynchus . The was many for the most part unsuccessful efforts to study the operculum of these small things. Mr. George Willett thought that he had it and labelled a large lot of the shells we dredged off Redondo Beach, Tachyrhunchus pratomus However, I was never able to see this difference in the opercumum, personally and still have my serious doubt if the things we have been labelling Tachyrhynchus are not in reality something that should be in the same basket with the Bittiums. However, we have several species identified by Dr. Fred Baker from off Point Loma, off Coronado Islands and from the Gulf. Of course, any one would instantly say Bittium at first glance as far as the shells are concerned. However, they can be separated from the Bittiums on sight because of the lack of sculpture but they resemble other species of Bittium too much for one to feel certain about them. (Burch).

Tachyrhynchus erosus (Couthouy), 1838. Arctic Ocean, south on the west to the Kuril Islands and on the east to the Aleutian Islands and Kodiak, Alaska. Also Greenland. (Dall). Prince William Sound (Eyerdam).
Type locality, Massachusetts Bay, coast of Maine.

Collecting data: Punuk Island, Bering Sea (Lewis); Drier Bay, Alaska (Eyerdam); Ancha Bay, Kamchatka (Lowe);

Tachyrhynchus erosus major Dall,1919. Mouth of the Colville River,Arctic Alaska and south through the eastern part of Bering Sea to the Pribilof Islands and Unimak Islands (Dall). Type locality, off the Pribilof Islands, Bering Sea in 51 fms.

Collecting data: Drier Bay, Alaska (Eyerdam).

Tachyrhynchus reticulatus (Mighels),1842. Arctic Ocean and eastern Bering Sea to the Aleutian Islands and southward to British Columbia. Also Greenland. Type locality, Bay Chaleur, in the Gulf of Saint Lawrence.

Collecting data: Frederick Sound in 12 fathoms (Lewis) (Willett);

Tachyrhynchus lacteolus (Carpenter),1865. Chignik Bay, Alaska Peninsula, east and south to Point Abreojos, L.C. Dr. A. Myra Keen advises " Type locality of holotype: Puget Sound".

Collecting data: Montague Island, Prince Wm. Sound in 18 fms.; Humpback B. near Wrangell in 15 fms. (Lewis)(Willett).

Tachyrhynchus lacteolus subplanatus (Carpenter),1865. Puget Sound to San Diego,Calif. Dr. A.M. Keen advises " Type locality of holotype is Puget Sound".

Tachyrhynchus pratomus Dall,1919. Semidi Islands, Alaska in 20 fms. to Loma, Calif. Type locality: Semidi Islands, Alaska in 20 fms.

Collecting data: off Redondo Beach in 75 fms. to 150 fms. (as discussed above) (Burch); off Point Loma, San Diego Co. in 50 fms. (Dr. F. Baker) and also off Bay, North Coronado Island (Dr. F. Baker).

Tachyrhynchus stearnsii Dall,1919. San Pedro, Calif.

Additions and Corrections

Petaloconchus montereyensis Dall,1919. This issue- 54:45. Mr. E.P. Chace brought a set of specimens of this species to the last meeting collected at Crescent City, Del Norte Co., Calif. and also a set from Point Vicente, Los Angeles County. The Crescent City record is an extension of range northward.

Vermicularia eburnea (Reeve), 1842 This issue 54:42 Mr. E.P. Chace submitted specimens of this species at the recent meeting collected at San Pedro, Calif.

Cerithidea californica hyporhyssa (Berry),1906. This issue 54:34-35. Mr. E.P. Chace states " My set collected in San Diego Bay back in 1914 or 1915 has some shells that have very flat whorls and an almost straight line from apex to aperture, and do not have an eroded appearance. Other shells from the same collecting have rounded whorls and an eroded appearance. All are more slender than the usual form- C. californica."

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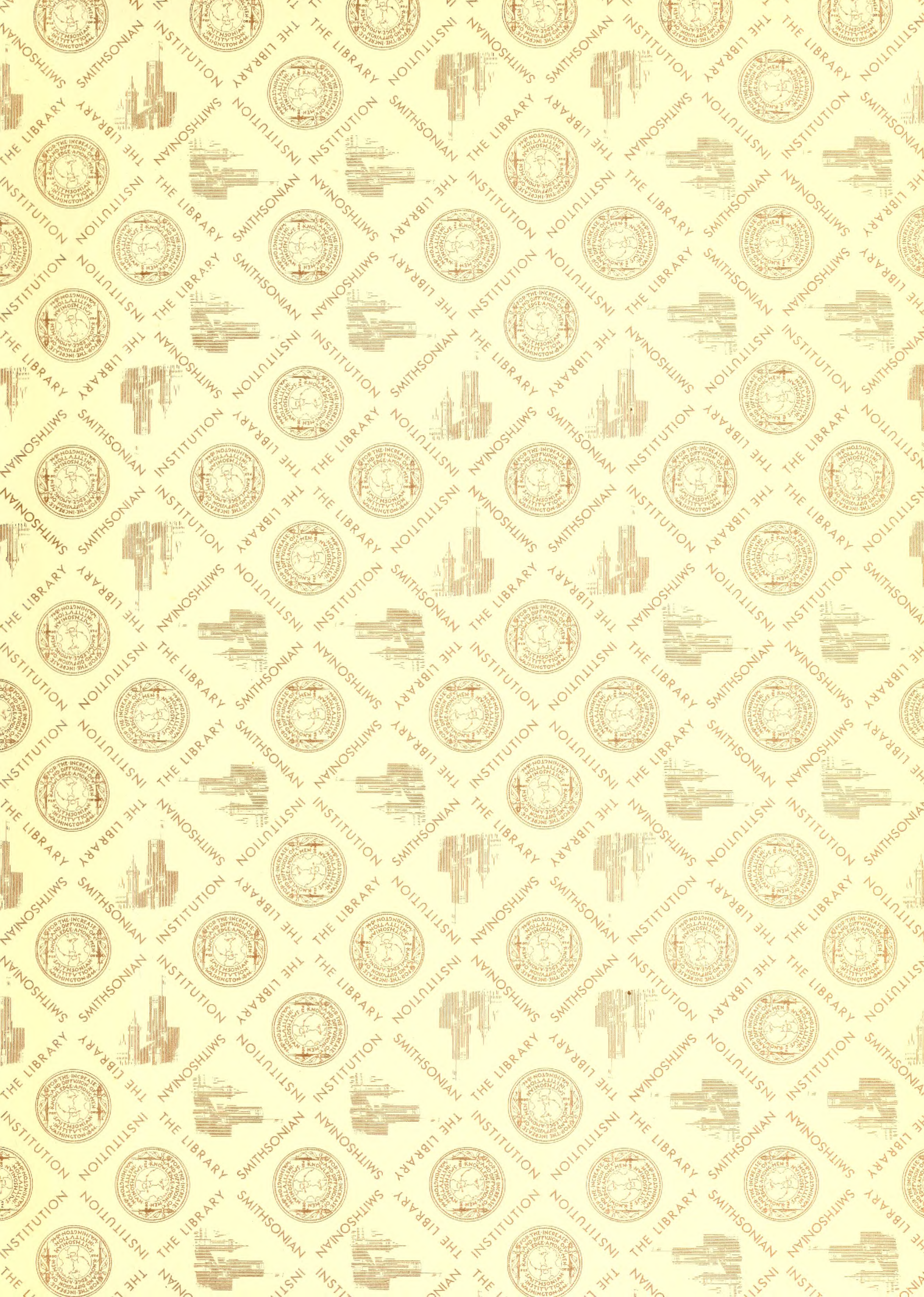
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